FINAL Environmental Impact Report /
Environmental Impact Statement

San Clemente Dam Seismic Safety Project

volume 2, Chapter 4.0 - 6.0

January 2008

Prepared for

California Department of Water Resources
U.S. Army Corps of Engineers

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CHAPTER 4.0

ENVIRONMENTAL SETTING, IMPACTS & MITIGATION MEASURES

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4.0 ENVIRONMENTAL SETTING, CONSEQUENCES & MITIGATION MEASURES

This chapter provides a description of the existing environmental setting (affected environment) for the San Clemente Dam Seismic Safety Project, and describes in-depth environmental impacts in 14 resource and issue areas:

- Geology and Soils (Section 4.1)
- Hydrology and Water Resources (Section 4.2)
- Water Quality (Section 4.3)
- Aquatic Biology and Fisheries (Section 4.4)
- Terrestrial Biology (Section 4.5)
- Wetlands (Section 4.6)
- Air Quality (Section 4.7)
- Noise (Section 4.8)
- Traffic and Circulation (Section 4.9)
- Cultural Resources (Section 4.10)
- Visual Resources/Aesthetics (Section 4.11)
- Recreation (Section 4.12)
- Land Use (Section 4.13)
- Environmental Justice (Section 4.14)
- Other Environmental Effects (Section 4.15)

The effects of the San Clemente Dam Seismic Safety Project, including the Proponent's Proposed Project, project alternatives, and the No Project/No Action Alternative, are evaluated for all issues that could potentially include significant impacts. Specific impact issues are defined for each resource area and are designated by a unique alpha-numeric identifier. Impacts and mitigation measure(s) are discussed for each issue and the corresponding alternative under which it would occur. For example, the first issue in the Air Quality section is AQ-1 Dam Site Activities. Air quality effects and mitigation associated with dam site activities are discussed under Issue AQ-1 for each alternative.

Where alternatives have the same impact, the impact is described completely the first time it is mentioned; the other alternatives, with the same impact, refer back to the original impact description. Not all impact issues apply to all alternatives and the discussion also identifies those that do not apply. A corresponding mitigation is identified for each impact. Significance thresholds (Standards of Significance, or Significance Criteria under the California Environmental Quality Act [CEQA]) have been established to assess the adverse impacts of the Proponents Proposed Project and project alternatives. Each resource section includes the adverse impacts in a subsection entitled "Environmental Resource Impact Standards and Methods" which precedes the discussion of Impacts and Mitigation. Some impacts are identified as "beneficial." An adverse impact would be less than significant if the impact is less than the threshold. If mitigation can be applied to an otherwise potentially significant impact to reduce it below the threshold of significance ("less than significant"), the impact would be "significant, mitigable." If mitigation cannot reduce the impact to less than significant, it would be "significant and unavoidable." Significant unavoidable impacts are summarized in Chapter 5.0, CEQA & NEPA Considerations.

Where appropriate, impacts are described in terms of their duration. We define "short-term" impacts to be those effects that occur throughout the construction period (coterminous with the number of construction seasons, which vary from one alternative to another), do not endure beyond the construction period. "Long-term" impacts are effects that endure beyond the construction period, even if not permanent.

Impact assessment methodologies are described following the discussion of Standards of Significance for each resource area. Again, this discussion occurs under the Proponents Proposed Project and applies to all of the alternatives. Data and supporting technical reports are provided as appendices to this Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

Following the California Environmental Quality Act CEQA, this EIR/EIS identifies the Proponents Proposed Project and its alternatives, including a No Project Alternative. Following the National Environmental Protection Act (NEPA), each alternative is analyzed in comparable detail. The impacts of all of the alternatives (Proponent's Proposed Project, Dam Thickening; Alternative 1, Dam Notching; Alternative 2, Dam Removal; Alternative 3, Carmel River Reroute and Dam Removal; and Alternative 4, No Project) are compared to one another and to existing conditions in the Project Area. To facilitate the understanding of impacts that occur over a period of time, an extended baseline environmental setting has been described for each resource area to the year 2030. This "2030 Baseline" describes environmental changes that are expected to occur over the next 25 years, and is intended to facilitate a more comprehensive analysis, considering trends and changes that may occur in the "existing conditions" baseline rather than comparing impacts to a snapshot moment in time. The 2030 Baseline is presented at the end of the environmental setting section for each resource area, before the environmental evaluations of the alternatives. The 25-year baseline period was chosen to be long enough to allow reasonably foreseeable trends to emerge, but not so long as to become purely speculative. It has no relationship to “project life.”

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4.1 GEOLOGY AND SOILS

This section describes the potential impacts of the San Clemente Seismic Safety Project on geology and soils of the Project Area. Geology and soil resources include geologic, seismic, and soils characteristics influenced by the project. Additional information is provided in this Final EIR/EIS which clarifies and amplifies the information included in the Draft EIR/EIS. This environmental setting section was prepared using information developed from the documents provided by the Recirculated Draft Environmental Impact Report (Denise Duffy & Associates 2000) which information was originally developed for the New San Clemente Project (MPWMD 1984), The Mark Group (1995), Woodward Clyde Consultants (1992). Erosion control methods are outlined in the Storm Water Pollution and Prevention Plan (SWPPP) in Appendix K.

4.1.1 ENVIRONMENTAL SETTING

Geologic Setting

TOPOGRAPHY

The San Clemente Dam site is located in the northern Santa Lucia Mountains, within the Southern Coast Ranges geomorphic province. The Southern Coast Ranges province is characterized by a series of northwest trending mountains and valleys. The Santa Lucia Mountains are the most westerly mountain range in the Southern Coast Ranges Province, and extend from Monterey Bay southeastward for approximately 125 miles. The range is bounded on the southwest by the Pacific Ocean and to the northeast by the Salinas Valley.

The topography of the region is characterized by high, narrow ridges, steep-sided hillsides, and incised drainages. Elevations in the northern portion of the range vary from approximately 800 feet at the confluence of the Carmel River and Cachagua Creek to nearly 4,800 feet. Slope gradients in the region are typically in the range of 45 to 90 percent (20 to 40 degrees), but vary locally from gently sloping on the surface of elevated stream terraces to near-vertical along the banks of incised canyons.

GEOLOGY

The Santa Lucia Range is the largest of several northwest-trending mountain ranges of crystalline basement complex known as the Salinian block. The Salinian basement complex underlies most of the Southern Coast Ranges geomorphic province, and is primarily composed of granitic rocks with local inclusions of metamorphic rocks. It is bounded by two major fault zones: the San Andreas Fault on the northeast, and the Sur-Nacimiento Fault zone on the southwest.

The major geologic units and structural features of the northern Santa Lucia Range in the Project Vicinity are depicted on Figure 4.1-1.

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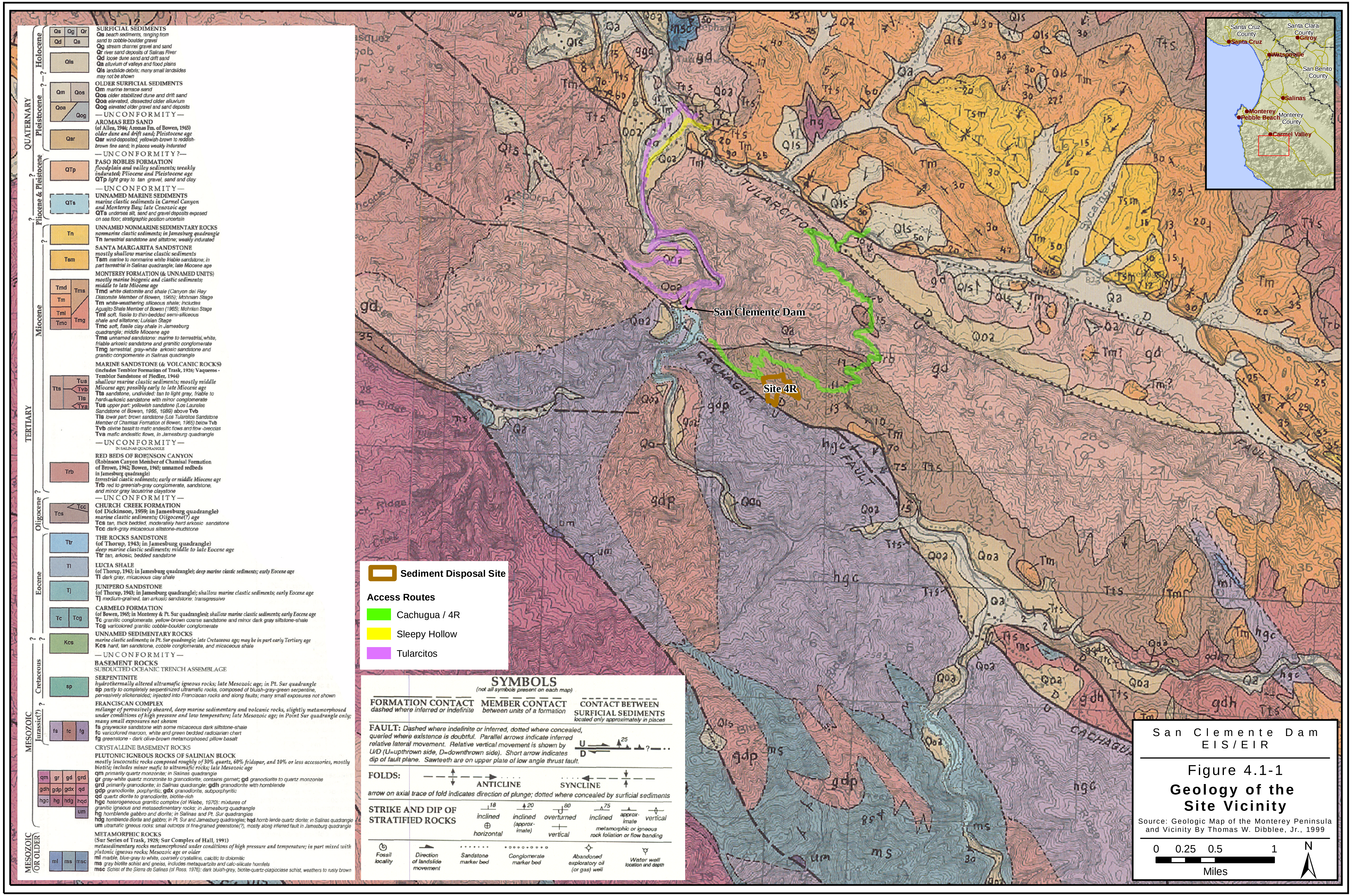

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The predominant geologic units in the vicinity of the San Clemente Dam are crystalline basement rock consisting of granodiorite, quartz monzonite, and a heterogeneous complex of mixed granitic and metasedimentary rocks. The broad belt of granitic rock is northwest-trending and extends to the Monterey Peninsula. The age of the granitic rocks in the area is considered to be middle to late Cretaceous (Compton 1966; Wiebe 1970, date not known with certainty, but approximately 100 million years old), while the metasedimentary rocks are older than the granitic rocks that engulf them.

Tertiary sedimentary rocks in the vicinity of the Dam site include three distinct formations. In order of decreasing age, these formations are referred to as: Unnamed Redbeds (Trb), Marine Sandstone (Tts), and Monterey Formation (Tm). The Marine Sandstone Formation is exposed along both the southern and northern margins of Cachagua Valley, and is in fault contact with the basement rocks along the Cachagua Fault, which strikes through the Dam site.

Quaternary (less than 2 million years old) deposits in the vicinity are unconsolidated stream terraces and alluvial fans that locally cover the crystalline basement, especially along the lower slopes and in drainages. The stream deposits, consisting of coarse gravel, sand and silt, include modern fluvial deposits located in the present river channel, as well as older, elevated terraces that were deposited as the ancestral Carmel River carved a channel through the mountains.

Seismic Setting

Tectonics and Structure

The Southern Coast Ranges geomorphic province is a region of active tectonism associated with movement of the Pacific Plate, on the southwest, relative to the North American Plate, on the northeast. The San Andreas Fault forms the boundary between these two tectonic plates, but movement occurs on additional faults over a broad region.

In a regional sense, the Salinian block generally is considered to behave as a rigid tectonic block (Dibblee 1976; Clark et al. 1974) during plate motions. However, the Salinian block can be divided into sub-regions on the basis of physiography and geologic structure and within which deformation is apparent. the Dam is situated in the northern Santa Lucia Range domain, which is the most intensely deformed sub-region of the Salinian block. In comparison to surrounding sub-regions, this sub-region is characterized by higher elevations, greater structural complexity, and an abundance of northwest-trending, "intra-Salinian" faults. Most of these faults are steeply dipping reverse faults that have disrupted the Tertiary rock record and elevated the mountain range. Quaternary activity is difficult to adequately assess for many of the intra-Salinian faults because of the relative lack of Quaternary deposits in the rugged interior of the northern Santa Lucia Range. Traditionally, geologists have considered the intra-Salinian faults incapable of generating significant earthquakes because these faults were formed under an older, compressional stress regime that has now been overshadowed by right-lateral transform movement (Dibblee 1976; Ross 1976). However, more recent analyses indicate that certain intra-Salinian faults, such as the Tularcitos Fault in the vicinity of the project, may have experienced at least some amount of Quaternary movement (Clark et al. 1974, The Mark Group 1995). The type of deformation associated with the most recent movement along these faults is probably a combination of compression and right-lateral strike-slip movement (The Mark Group 1995).

Seismogenic Potential of Nearby Faults

San Clemente Dam is susceptible to earthquake shaking from several different sources. Table 4.1-1: Distance to Faults San Clemente Dam summarizes the distance from the San Clemente Dam to these faults, as well as the fault type. Not all of these faults are active; Table 4.1-2: Seismogenic Potential of Nearby Faults summarizes characteristics of active faults. The faults forming the margins of the Salinian block, the San Andreas Fault zone and the Sur-Nacimiento Fault zone, are clearly capable of generating relatively frequent, moderate to large earthquakes. In addition, some of the intra-Salinian faults appear to have a potential to generate significant earthquakes. Intra-Salinian faults in proximity to the Dam include the Cachagua, Tularcitos, Blue Rock, Miller Creek and Chupines faults (The Mark Group 1995). Fault activity in the immediate area of the Dam site has been thoroughly investigated (Rogers E. Johnson & Associates 1984a, 1984b, 1985a, 1985b). No active faults are known to pass through the Dam site, although a small cross fault connecting the Tularcitos and Cachagua faults or a fault sliver off the Cachagua fault may exist. If this fault does exist, no movement has occurred on it in the past 125,000 years (The Mark Group 1995).

Table 4.1-1: Distance to Faults San Clemente Dam

Fault Name	Fault Type	Distance (miles) and Direction
Cachagua	Reverse-oblique	0
Blue Rock	Reverse	4 SW
Miller Creek	Reverse	8 SE
Tularcitos	Reverse/Strike-slip	1.5 NE
Palo Colorado	Reverse-oblique	8 SW
Chupines	Reverse	5 NE
Sur-Nacimento	Reverse oblique	12 SW
Rinconada-Reliz-King City	Strike-slip	12 NE
San Andreas	Strike-slip	29.0 NE

Table 4.1-2: Seismogenic Potential of Nearby Faults[1]

Fault Name	Minimum Distance to Site (mi)	Estimated Maximum Earthquake Magnitude (local)	Estimated Peak Horizontal Acceleration 50th Percentile[(2)]
Tularcitos	1.25[(3)]	6.5[(3)]	0.70g[(3)]
Chupines	5	6.5	0.30g
Rinconada-Reliz	12	7	0.25g
San Andreas (central creep)	28[(3)]	8.0[(3)]	0.19g[(3)]

(1) Information in this table is taken from Converse Consultants (1982) and WCC 1992.

(2) Hypothetical accelerations based on predicted peak acceleration curves by Joyner and Boore (1981) except for Tularcitos and San Andreas faults, which used 5 attenuation relationships (WCC 1992)

(3) Maximum magnitude, distance, and peak acceleration taken from WCC 1992.

The seismogenic potential of significant nearby faults was previously evaluated by Geomatrix (1985), Bechtel (1988) as cited in Woodward Clyde Consultants (1992), Woodward Clyde Consultants (1992) and The Mark Group (1995) in order to assess the Maximum Credible Earthquake (MCE) and ground motions for seismic design considerations. Table 4.1-2: Seismogenic Potential of Nearby Faults summarizes the potential seismic load that earthquakes on nearby faults could impart to the San Clemente Dam site. The conclusions of these reports, and other previous work, are that the Tularcitos and Cachagua faults are the most significant faults in terms of seismic design because of their earthquake potential and proximity to the San Clemente Dam. However, there is compelling geologic evidence that the Cachagua Fault has not experienced significant movement in the past several tens to several hundred thousand years (The Mark Group 1995). Therefore, the Cachagua Fault is not considered active, and the Tularcitos Fault is considered to be the most significant seismogenic source for the Dam. Descriptions of the Tularcitos and Cachagua Fault zones are presented in the following sections, summarized from data presented by The Mark Group (1995).

Tularcitos Fault Zone

Indications of late Quaternary movement along the Tularcitos Fault zone include: (1) youthful geomorphic expression along individual fault traces in the Carmel Valley area (McKittrick 1987, The Mark Group 1995), (2) offset stream terrace deposits and colluvium of probable late Quaternary age, and (3) possible connection to the Monterey Bay Fault Zone (MBFZ), which appears to have been active in the past 11,000 years (Greene et al. 1973). Recently, a sample of charcoal from colluvium displaced by the Tularcitos Fault was radiometrically dated to be approximately 7,940 to 7,620 years old (reported in The Mark Group 1995). Thus, there is increasing evidence that the Tularcitos Fault has experienced movement during Holocene time (less than 11,000 years ago). In addition, plots of earthquake epicenters suggest a micro seismicity pattern roughly aligned along the Tularcitos-Navy-MBFZ trend (Cockerham et al. 1990).

Assessment of MCE for seismic design requires an estimate of fault rupture length and rupture area, both of which are based on total fault length. The total length of the Tularcitos Fault zone is difficult to assess, not only because of the discontinuous nature of individual segments within the fault zone, but also because of the uncertainty associated with the potential that the Tularcitos Fault is connected to other faults mapped to the northwest and southeast. In general, the Navy and MBFZs, located to the northwest, have been included as part of the Tularcitos Fault zone, but the short, discontinuous fault segments located east of approximately longitude 121° 30' have not been included (The Mark Group 1995). The two primary segments of the Tularcitos Fault zone are discussed below:

Navy-MBFZ. Although some previous workers consider the Navy Fault to be independent of the Tularcitos Fault, there is no clear evidence that these faults are not connected beneath Carmel Valley. Published maps do not portray any geologic structures that clearly cross the MBFZ-Navy-Tularcitos Fault zone, and recent work (summarized in The Mark Group 1995) can be used to strengthen the argument that the Navy and Tularcitos faults may be connected. Thus, in the absence of data clearly demonstrating that the faults are not connected, and based on similar trend and sense of offset between the two faults, the Navy Fault and Tularcitos Fault are considered to be the same fault zone for the purpose of seismic hazard analysis. In addition, the Navy Fault has been considered to be an extension of the MBFZ for similar reasons (The Mark Group 1995).

Some workers have portrayed the Tularcitos Fault as a buried fault (concealed beneath Carmel Valley) that extends to the coastline and to Cypress Point (Bowen 1965 and 1969). To make that fault connection requires several abrupt bends in fault orientation, and supposedly includes a fault with an opposite sense of movement (Greene et al. 1973). Thus, this connection does not appear to be as likely as the Navy-MBFZ connection.

Seismic Potential of the Tularcitos Fault Zone. The Tularcitos Fault shows evidence of late Quaternary, and probably Holocene (less than 11,000 years old), movement. The potential connection to the Navy-MBFZ makes the resulting combined fault zone significant in terms of length, activity, and proximity to the San Clemente Dam.

Woodward-Clyde Consultants (WCC 1992) conducted an extensive study of the seismic characteristics of the Tularcitos Fault as it may affect the San Clemente Dam site. They used five different methods for estimating the magnitude of earthquake and ground motion estimates. The methods include Seed and Schnabel (1980), Joyner and Boore (1988), Campbell (1988), Sadigh (1987), and Idriss (1985, 1987) [all are referenced in WCC 1992]. The WCC (1992) study developed estimates for the median and standard deviation of peak horizontal accelerations in the free field at the Dam site from the MCE on the Tularcitos Fault (magnitude 6.5) and the San Andreas Fault (magnitude 8.0). The average of the five methods for the Tularcitos Fault was a peak horizontal acceleration of 0.69 g, and a value of 0.70 g was used for design purposes (WCC 1992). From the San Andreas Fault, the average of the maximum peak horizontal accelerations was calculated to be 0.19 g, much less than that caused by the Tularcitos Fault (WCC 1992).

Cachagua Fault

The Cachagua Fault is represented by a complex zone of steep, southwest dipping reverse faults that mark the southwestern edge of the Cachagua Valley. It passes through the San Clemente Dam site. Results from The Mark Group's study of the Cachagua Fault activity (1995) indicate that there is compelling geologic and geomorphic evidence that the Cachagua Fault has not experienced movement since at least the past 85,400 to 213,500 years. This conclusion is based upon the estimated age of Quaternary stream terrace deposits that cover, but are not offset by, the fault. Thus, the Cachagua Fault is inactive according to the criteria established by the California Division of the Safety of Dams

Other Faults

The activity and seismogenic potential of the Blue Rock and Miller Creek faults are not known; however, Buchanan-Banks et al. (1978) indicate that the Blue Rock fault has not been active in Quaternary time. The earthquake potential of both faults is overshadowed by the longer Tularcitos Fault zone.

Although unmapped faults may exist in the study area, their potential seismic impact at the site would not likely be greater than that of the Tularcitos Fault.

In addition, WCC (1992) calculated that an unlikely magnitude 8 earthquake on the San Andreas Fault would generate a peak ground acceleration of only 0.19 g, much less than the 0.70 g calculated for the Tularcitos Fault.

Reservoir-induced seismicity may occur at the site, but there are no recorded instances of this phenomenon greater than magnitude 6.4 (Koyna Reservoir, India 1967). Therefore, peak ground accelerations would be less than those calculated for the Tularcitos Fault.

Landslides

The seismically active Santa Lucia Range is prone to landslides. Relatively rapid uplift of the range leads to the deep, V-shaped canyons with sharp dividing ridges (Smith et al. 2004). Rosenberg (2001) assessed the Monterey County region for landslide susceptibility, including the Carmel River watershed. The study area includes landslide susceptibility ranging from moderate to high, particularly in the steep abutments of the Dam and downstream slopes. Landslides are also currently a significant source of sediment in the watershed (Smith et al. 2004). The largest active landslide in the Carmel subwatershed is located upstream of the San Clemente Dam (Smith et al. 2004). Rosenberg (2001) mapped and analyzed a large landslide located downstream from the San Clemente Dam near the trout-rearing facility in Sleepy Hollow.

A geological-geotechnical investigation was conducted at the site in conjunction with the design of the seismic retrofit (Woodward-Clyde Consultants 1998) and the abutments were found to be stable. Road construction must take landslide formation potential in to account in the testing and design phase (Smith et al. 2004).

Soils

The soils in the vicinity of the San Clemente Dam consist of the Cieneba series, Junipero Sur Complex, and rock outcrop. The Cieneba series is typical of soils developed on steep mountain slopes consisting of grantic and metamorphic rock. The soils have very rapid runoff characteristics, and a very high erosion potential (USDA Soil Conservation Service [SCS] 1978).

The Junipero Sur Complex is also typical of soils developed on steep slopes. Like the Cieneba series, the Junipero Sur Complex soils have very rapid runoff characteristics, and a very high erosion potential (SCS 1978). Both soil types have low shrink-swell characteristics. The Junipero Sur Complex tends to be more corrosive to both steel and concrete than the Cieneba series.

River Bank Erosion

Sediment erosion, transport, and deposition are discussed in more detail in Section 4.2, Hydrology and Water Resources. Issues relevant to the geologic characteristics of the area are summarized in the following discussion.

The existing dams on the Carmel River currently trap all of the bedload and a portion of the suspended load produced in the upper watershed. The current trap efficiency of Los Padres Dam is estimated to be 72 percent; the trap efficiency for the smaller San Clemente Dam is currently estimated to be about 85 percent, but is projected to decline to about 35 percent by 2010 to 2015.

After completion of the San Clemente Dam in 1921, the portion of the Carmel River downstream of the Dam adjusted to the loss of bedload material by deepening its channel. As the river incised between 1921 and the early 1960s, an extensive riparian forest developed, protecting the banks from erosion, except at bends. By about 1940, the river channel had adjusted to the presence of San Clemente Dam. A considerable amount of riparian vegetation was lost during the 1976-77 drought; groundwater pumping during this time lowered the water table in parts of the valley. With the banks unprotected by riparian vegetation, the river adjusted to subsequent flood flows by eroding both the channel bed and banks. As a result of this process, the middle reach of the river between the Garland Ranch Regional Park and Schulte Road changed drastically from a narrow, deep, meandering channel with well-developed riffles and pools to a wide, shallow channel with eroded banks and an unstable bed.

Since 1980, the MPWMD has monitored the health and state of the Carmel River riparian corridor closely. A ten-year program was implemented in 1983 to restore stability to portions of the river that had suffered significant erosion and had become seriously degraded in terms of wildlife habitat. Approximately $1.3 million was spent over the ten-year period for river restoration.

The sediment transport characteristics of the Carmel River and its tributaries have been studied extensively. The combination of the most severe drought on record in 1976-77 and an extremely wet period between 1978 and 1983 caused unusually high amounts of sediment to be discharged into the riverbed. Sediment measurements conducted during the wet period most likely reflect a short to medium term condition in which a large amount of sediment was moved. Many of the homes in Carmel Valley are built on a broad terrace deposited by large floods in 1911 and 1914 (Kondolf 1983). The terrace is a reminder that floods, sedimentation, and related channel stability are of serious concern seasonally to the communities downstream from San Clemente Dam. Refer to Section 4.2, Hydrology and Water Resources and its appendices for a comprehensive assessment of geomorphological conditions on the river.

Baseline 2030 Conditions

Geologic characteristics are not anticipated to change significantly between the present and the year 2030.

4.1.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

In accordance with CEQA, agency and professional standards, a project impact would normally be significant if the project would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss injury or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, including liquefaction, or landslides; or
- Result in substantial soil erosion or the loss of topsoil; or
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, or potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

Impact Assessment Methodology

Geological information from The Mark Group (1995), Woodward Clyde Consultants (1995), Denise Denise Duffy & Associates, Inc. (2000), and other sources cited in this section was reviewed with respect to the Proponent's Proposed Project and the alternatives. Features of the Proponent's Proposed Project and the alternatives were also projected onto the geology map (Figure 4.1-1) and the soils map prepared by the USDA Soil Conservation Service (SCS 1978). These data were reviewed to identify potential issues regarding geologic hazards or potential issues associated with the soils of the area. Based on this information, an assessment of the significance of geologic hazards based on the standards of significance above was made.

4.1.3 IMPACTS AND MITIGATION

The following impact issues have been defined for geology, seismic, and soils issues:

- GS-1: Ground Shaking (risk of dam failure due to seismic activity)
- GS-2: Access Route Landslides and Slope Stability (risk of oversteepened or weakened hillsides)
- GS-3: Reservoir Landslides and Slope Stability (risk of landslides into reservoir)
- GS-4: Soil Erosion (risk of erosion along access road improvements and in sediment disposal areas; sediment and rock discharge to streams)
- GS-5: Bypass Rock Removal by Blasting (alteration of existing topography due to blasting and rock removal)
- GS-6: Erosion at Left Dam Abutment (risk of erosion due to dam overtopping)

Proponent's Proposed Project (Dam Thickening)

Issue GS-1: Ground Shaking

Risk of dam failure due to seismic activity
Determination: ***less than significant, no mitigation required***

IMPACT

Seismicity is a relatively widespread geologic hazard to the project and alternative areas. Because the Proponent's Proposed Project lies within a high-risk seismic area, it likely would be subject to ground shaking during construction or continued operation.

MITIGATION

No mitigation is required for this impact as the San Clemente Dam Seismic Safety Project is designed to withstand a MCE, and peak ground accelerations, a condition that cannot be met by the existing dam. The project would meet the EIR/EIS purpose and need of eliminating the potential for dam failure during the MCE.

Issue GS-2: Access Route Landslides / Slope Stability

Risk of slides due to oversteepening hillsides
Determination: ***less than significant with mitigation, short-term***

IMPACT

Landslides could be triggered during the construction or operation of the Proponent's Proposed Project by oversteepening hillsides during the improvement of access routes.

These improvements may require notching into adjacent hillside slopes, which could increase susceptibility to a landslide.

MITIGATION

Prior to conducting access road improvements, a qualified geotechnical engineer or engineering geologist would survey all road rights-of-way to provide construction design specifications. To ensure slope stability, BMPs developed during design specifications will be implemented in addition to applicable ones identified in the SWPPP (Appendix K) that would avoid any potential for landslides. This would mitigate any impact to a less than significant level.

Issue GS-3: Reservoir Landslides / Slope Stability

Risk of slides due to oversteepening hillsides
Determination: ***less than significant, no mitigation required***

IMPACT

Under the Proponent's Proposed Project the reservoir would operate over a very limited range of elevations (from the bottom of the sluice gates at El. 491 to the spillway crest at El. 525). It is therefore unlikely that a landslide striking the reservoir would generate a large wave or waves that would overtop the Dam because the reservoir has been largely filled with sediment. The shallow reservoir also would minimize the potential for seepage pressures to destabilize the rock mass around the reservoir rim.

MITIGATION

No mitigation would be required for this impact.

Issue GS-4: Soil Erosion

Risk of erosion along access road improvements and in sediment disposal areas; sediment and rock discharge to streams
Determination: ***less than significant with mitigation, long-term***

IMPACT

As part of the access roadway modifications and improvements, blasting of canyon walls at select locations adjacent to the low and high roads would be required to widen roadways for equipment access. Road improvements immediately upslope of the river or where vegetation may be removed to accommodate road widening or new road construction could cause localized changes in drainage patterns, and these in turn could result in erosion and introduction of sediment or bits of rock into the stream channel. Construction along steep hillslopes and banks adjacent to watercourses could affect water quality by increasing turbidity or by introducing foreign materials and construction debris. Road construction activities could alter drainage patterns, initiate slope instability, accelerate erosion, and discharge sediments to stream channels.

MITIGATION

Potential soil erosion impacts would be mitigated to a less than significant level with implementation of standard erosion control methods and BMPs on both the upslope and downslope sides of all construction zones. No fill would be placed on steep canyon slopes directly above the river. Retaining walls would be used where road widening would occur immediately upslope of the river on steep banks. Erosion controls would be adequately sized and appropriately located. Drainage facilities and slope protection methods would function throughout the construction and revegetation period. Erosion controls that prevent soil or sediment from entering the river would be monitored for effectiveness, and maintained throughout the construction operations. BMPs would be customized to address site-specific conditions encountered on the steep slopes that adjoin the river.

Erosion control measures are included in the the preliminary draft of the Stormwater Pollution and Protection Plan (SWPPP) located in Appendix K. This plan may be further modified during permit consultation with the Central Coast Regional Water Quality Control Board (CCRWQCB) and other appropriate permitting agencies, including the Monterey County Planning and Building Inspection Department. CAW has incorporated these mitigation measures as part of the Proponent's Proposed Project (Specifications Section 01560 Environmental Protection and Special Controls, Sections 1.02 and 1.06, Woodward-Clyde Consultants, December 9, 1998). The agency approved specifications would require the contractor to submit measures included in the SWPPP (Appendix K) that includes, as a minimum, the following erosion control methods and procedures:

- Use of filter fabrics, berms, hay bales, and other means to control surface runoff and prevent erosion;
- Monitoring erosion control methods for effectiveness and maintenance of these methods throughout the duration of construction operations;
- Constructing fills and spoil areas by selective placement to eliminate surface silts or clays which may erode;
- Controlling surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation by holding the areas of bare soil exposed at one time to a minimum, and providing temporary control measures such as berms, dikes, and drains; and
- Inspecting cut slopes periodically to detect evidence of possible future slope failures, and possible rock raveling which could be hazardous to personnel working in the excavation area below.

Where blasting is conducted near the Carmel River or other sensitive habitats, a blasting mat would be placed over the rock walls in order to capture and direct flying rock debris to fall onto the existing roadway. In addition, temporary wall structures made of wood and/or steel would be erected adjacent to the existing access road to contain blasted rock on the road.

Disturbed areas would be immediately revegetated upon completion of road improvements using permanent revegetation to replace trees, shrubs, and grasses. If there is insufficient time prior to the runoff season to permanently revegetate impacted areas, temporary erosion control and revegetation actions would be implemented for any winter season prior to completion of the project. Temporary over-winter erosion control and revegetation actions may include such methods as the use of geofabrics and hydroseeding to provide an annual ground cover until the spring growing season when more permanent revegetation methods should be implemented. Installation of any geotextile or mechanical over-wintering protection would be properly installed to prevent undermining or washout during winter rains (see also Mitigation Measures for Section 4.3 Water Quality and Section 4.5 Terrestrial Biology).

Issue GS-5: Bypass Rock Removal by Blasting

The diversion bypass would not be constructed under the Proponent's Proposed Project. This impact would not occur.

Issue GS-6: Erosion at Left Dam Abutment

This impact issue would not occur because the San Clemente Dam Seismic Safety Project is designed to avoid it. The Proponent's Proposed Project would meet the EIR/EIS purpose and need of eliminating the potential for dam failure due to erosion at the left abutment under a scenario where the Dam is overtopped by the Probable Maximum Flood (PMF).

Alternative 1 (Dam Notching)

Geology/Soils impacts and mitigation for Issues GS-1 (Ground Shaking), GS-2 (Access Route Landslides and Slope Stability), and GS-3 (Reservoir Landslides) would be the same as the Proponent's Proposed Project. Issues GS-5 (Bypass Rock Removal by Blasting) and GS-6 (Erosion at Left Dam Abutment) would not occur under Alternative 1.

Issue GS-4: Soil Erosion

Risk of erosion along access road improvements and sediment disposal areas; sediment and rock discharge to streams
Determination: ***less than significant with mitigation, long-term***

IMPACT

The impact potential would be the same as discussed for Impact GS-4 for the Proponent's Proposed Project, with the addition of the potential for erosion at the sediment disposal area if adequate soil erosion BMPs are not employed.

MITIGATION

Potential soil erosion impacts would be reduced to a less than significant level with implementation of the measures outlined for Issue GS-4 for the Proponent's Proposed Project. Additional erosion control measures would be employed at the sediment disposal area to minimize soil erosion during construction and post-construction periods to a less than significant level. Additional details are included in the SWPPP in Appendix K. These measures would include:

- Stripping and stockpiling of organic soils for use in subsequent restoration and revegetation of the site once sediment placement has been completed;
- Placing a culvert pipe along the ravine bottom the full length of the site to help manage storm waters and minimize erosion during construction operations;
- Placing the sediment in thin lifts and compacting the sediment;
- Placing the sediment with a stable side slope (average 2.75:1);
- Placing concrete debris from the Dam notching on the pile for long-term erosion protection at the toe of the pile and on the groins along the contact between the pile and the hillside abutments;
- Providing interim drainage and diversion of ravine flows (at the end of construction season);
- Stabilizing sloping sediment surfaces and other disturbed areas by installing erosion protection features such as erosion control mats, straw bales, and sediment traps along the toe of the pile and other disturbed areas (at the end of construction season);
- Providing sediment collection features such as silt fences, straw bales, and sediment traps along the toe of the pile and other disturbed areas; and
- Restabilizing the final graded surface with placement of the stockpiled topsoil, implementation of erosion control measures as described above, and revegetation with native plants and trees obtained from the site vicinity.

Alternative 2 (Dam Removal)

Geology/soils Impact Issues GS-1 (Ground Shaking), GS-3 (Reservoir Landslides), and GS-6 (Erosion at Left Dam Abutment) would not occur, since the Dam would be removed. Impacts and mitigation for Issue GS-2 (Access Route Landslides and Slope Stability) and would be the same as the Proponent's Proposed Project. Issues GS-5 (Bypass Rock Removal by Blasting) and GS-6 (Erosion at Left Dam Abutment) would not occur under Alternative 2.

Issue GS-4: Soil Erosion

Risk of erosion along access road improvements and in sediment disposal areas; sediment and rock discharge to streams
Determination: ***less than significant with mitigation, long-term***

IMPACT

The impact potential would be the same as discussed for Impact GS-4 for the Proponent's Proposed Project, with the addition of the potential for erosion at the sediment disposal area if adequate soil erosion BMPs are not employed.

MITIGATION

Mitigation measures would be the same as discussed for Alternative 1.

Alternative 3 (Carmel River Reroute and Dam Removal)

Geology/soils Impact Issues GS-1 (Ground Shaking), GS-3 (Reservoir Landslides), and GS-6 (Erosion at Left Dam Abutment) would not occur, since the Dam would be removed. Impacts and mitigation for Issue GS-2 (Access Route Landslides and Slope Stability) would be the same as the Proponent's Proposed Project.

Issue GS-4: Soil Erosion

Risk of erosion along access road improvements and in sediment disposal areas; sediment and rock discharge to streams
Determination: ***less than significant with mitigation, long-term***

IMPACT

The impact potential would be the same as discussed for Impact GS-4 for the Proponent's Proposed Project, with the addition of the potential for erosion at the sediment disposal area if adequate soil erosion BMPs are not employed.

MITIGATION

Mitigation measures would be the same as discussed for Alternative 1.

Issue GS-5: Bypass Rock Removal by Blasting

Topography alteration and safety hazards associated with blasting
Determination: ***less than significant with mitigation, short-term***

IMPACT

Blasting will alter the landscape by removing approximately 145 acre-feet of rock in blasting a 450-foot-long channel between the Carmel River and San Clemente Creek, approximately 2,500 feet upstream of the Dam. The area is not accessible to the public and has not been designated as a scenic viewshed; therefore the change to topography would be less than significant.

Blasting entails safety hazards including the potential to trigger landslides on adjacent unstable slopes.

MITIGATION

A blasting plan would be prepared as part of final design for construction that would summarize BMPs to be employed during all blasting activities in order to ensure safety and minimize potential damage from an associated landslide. Such measures would include (1) controlling of excessive vibration by limiting the size of charges and using charge delays that stagger each charge in a series of explosions, and (2) following procedures for safe storage, handling, loading, firing, and disposal of explosive materials. Preliminary blasting BMPs have been incorporated into the SWPPP (Appendix K). Implementation of additional measures in a complete blasting plan (to be required as part of final construction specifications) would reduce blasting-related impacts to a less than significant level.

The applicant will require the contractor to submit BMPs that meet measures specificied in the SWPPP (Appendix K).

Alternative 4 (No Project)

Geology/soils Impact Issues GS-2 (Access Route Landslides and Slope Stability), GS-3 (Reservoir Landslides), GS-4 (Soil Erosion), and GS-5 (Bypass Rock Removal by Blasting) would not occur under Alternative 4.

Issue GS-1: Ground Shaking

Risk of dam failure due to seismic activity
Determination: ***significant, unavoidable, long-term***

IMPACT

San Clemente Dam is sited within a high-risk seismic area. Under the No Project Alternative (Alternative 4), the Dam would not be removed or retrofitted to reduce the potential of dam failure from seismic-related hazards (including ground shaking). This alternative would not address concerns regarding dam safety under a MCE and would not remove the threats to human health and safety. Under the No Project Alternative, this impact would be significant and unavoidable.

MITIGATION

Under the No Project Alternative, no mitigation would be provided for dam safety or other geological/soils hazards.

Issue GS-6 Erosion at Left Dam Abutment

Risk of erosion at the left abutment due to dam overtopping
Determination: ***significant, unavoidable, long-term***

A subsurface investigation was conducted at the site in conjunction with the design of the seismic retrofit (Woodward-Clyde Consultants 1998). In general, the Dam abutments were found to be stable. However, on the downstream side of the left abutment, some potentially unstable rock blocks were mapped in an area subject to overtopping. Although some remedial measures to improve foundation rock performance were specified, none have been undertaken.

MITIGATION

Under the No Project Alternative, no mitigation would be provided for dam safety or other geological/soils hazards

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4.2 HYDROLOGY AND WATER RESOURCES

This section describes the potential impacts of the San Clemente Seismic Safety Project on the water resources of the Project Area. Water resources include hydrology, hydraulics, and sediment transport in the Carmel River and other watercourses influenced by the project. In response to comments, additional information is provided in this Final EIR/EIS, which clarifies and amplifies the information included in the Draft EIR/EIS. The following environmental setting section was prepared using information developed from the documents provided by the Recirculated Draft Environmental Impact Report (Denise Duffy & Associates 2000), MEI 2003, 2005, 2007a, 2007b), MWH (2005), and WCC (1997b). References to specific river reaches along the Carmel River downstream of the SCD are from MEI (2003) and are explained in Appendix G of this report, San Clemente Dam Screening of Sediment Disposal Sites.

4.2.1 ENVIRONMENTAL SETTING

For hydrology and water resources, the area affected by the San Clemente Dam Seismic Safety Project includes the CAW Monterey service area, the San Clemente Reservoir in the drawdown zone, and the channel downstream of the Dam that could receive higher flows or sediment transport during project construction or operation, including drawdown and dewatering.

Water Supply and Storage

SCD does not provide water storage for water supply (nor does it provide flood control); the facility provides a point of diversion for the CAW water system. This feature of the existing project is preserved under all project alternatives (under some alternatives this is accomplished by moving the point of diversion upstream on the Carmel River). This is a NEPA/CEQA objective or purpose for the project (see Section 1.4). The San Clemente Dam Seismic Safety Project does not affect water supply.

SCD originally impounded approximately 1,425 acre-feet (AF) of water at a spillway elevation of 525 feet. Until 1996, stop logs were added to the top of the spillway each spring to increase the total water storage by about 600 AF. Due to ongoing sedimentation, the reservoir storage volume has been reduced to approximately 100 AF, as measured from the spillway elevation. During all months, the reservoir passes all streamflow that enters the reservoir downstream to the Carmel River.

Ground Water Supply and Aquifer Storage

CAW has served the Monterey Peninsula since 1966. CAW water sources include wells located along the Carmel River, drawing from the Carmel Valley Aquifer (a source in continuity with the Carmel River), and from a network of eight wells located in the Seaside Basin, a source accessed by other water users and purveyors as well. In 1987, the CAW water production peaked at approximately 18,000 AF/year. Total water facilities include two small reservoirs on the Carmel River, Los Padres Dam, and San Clemente Dam.

The Carmel Valley Aquifer underlies the Carmel River, and presently supplies approximately 70 percent of the Monterey Peninsula's water through CAW's system. In 1995, the SWRCB found that water flowing in the aquifer located below RM 15 and in continuity with the Carmel River is actually a subterranean stream over which the SWRCB has jurisdiction. In Order 95-10, the SWRCB found that CAW was, in effect, diverting approximately 10,730 AF/yr from the Carmel Valley Aquifer without a SWRCB permit, and ordered CAW to develop and implement a plan to replace the water that it had historically diverted from the Carmel Valley Aquifer. This order affects 69 percent of CAW's historical water supply for its entire Monterey District. CAW was also ordered by the SWRCB to reduce pumping in the Carmel Valley by 20 percent from historic levels pending the pursuit and implementation of a replacement water supply.

Recent studies have shown that groundwater pumping in parts of the Seaside Groundwater Basin that supplies approximately 30 percent of the CAW water supply is being overdrafted. CAW therefore believes that it is prudent to reduce its pumping from the basin by at least 1,000 AF/yr. Therefore, CAW must replace a total of 11,730 AF/yr of its current water supply sources from the Carmel Valley Aquifer and Seaside Basin. Since 1995, CAW customers have managed to reduce water use on the Monterey Peninsula from more than 17,000 AF/yr to 14,000 AF/yr, a reduction of more than 20 percent. However, conservation efforts alone cannot adequately address the water demand and supply issues faced by the community.

Proposed Water Supply Projects

EIR/EIS Section 5.3 (Cumulative Impacts) describes several reasonably foreseeable future actions in the Monterey area related to water supply.

Prior to 1995, several water supply projects had been proposed by the MPWMD, the most recent being a New Los Padres Dam (NLPD). Although MPWMD had obtained key permits from the SWRCB and the United States Army Corps of Engineers (USACE) for construction of the NLPD, the MPWMD was unable to pass a bond measure to finance and construct it. CAW then proposed the Carmel River Dam and Reservoir Project (CRDRP), which was physically the same as NLPD but allocated water to releases to the Carmel River instead of to growth. There was considerable public and resource agency opposition to the proposed CRDRP and this project also failed to move forward.

On August 6, 1998, the California Public Utilities Commission (CPUC) issued a decision requiring CAW to prepare a long-term water supply contingency plan describing the program or combination of programs that CAW would pursue if the CRDRP could not be implemented (Decision 98-08-036 [1998] 81 CPUC2d 648). CPUC Decision 98-08-036 also required a short-term contingency plan that "shall include mandatory conservation, rationing, and…any other short-term measures to conserve or add to water supply."

Meanwhile, the Legislature passed and the Governor signed Assembly Bill (AB) 1182 (Chapter 797, Statutes of 1998), which required the CPUC to develop "Plan B," a long-term water supply contingency plan as an alternative to the proposed dam for meeting the water needs of Monterey residents. The development of CPUC Plan B entailed identifying and analyzing potential water supply components and assembling alternative strategies according to their engineering, operational, economic, logistical, and environmental characteristics. The Plan B process culminated in the recommendation of an independent team of environmental and engineering consultants selected by the CPUC on how to best meet the water supply needs of the Monterey Peninsula and surrounding region. After a series of public hearings and workshops conducted by the CPUC, Plan B was suggested as the best alternative to the long-debated CRDRP. In 2002, CAW's internal review of Plan B led to a revision of its CPUC application for the CRDRP to propose a water supply project with two major components: seawater desalination, and aquifer storage and recovery (ASR).

To accomplish the objective of reducing its reliance on the Carmel River Aquifer and the Seaside Groundwater Basin, CAW has initiated the design, environmental analysis, and permitting of a new seawater desalination facility and aquifer storage project called the Coastal Water Project (CWP). The primary objectives of the CWP are to:

- Satisfy CAW's obligations to meet the requirements of SWRCB Order 95-10;
- Diversify and create a reliable drought-proof water supply for CAW's customers;
- Protect the Seaside Basin for long-term reliability;
- Protect listed species in the riparian and aquatic habitat below SCD;
- Protect the local economy;
- Avoid a potential building moratorium; and
- Minimize water rate increases by creating a diversified water supply portfolio.

Climate and Topography

CAW's Monterey service area is located in a semi-arid central California coastal area that is entirely dependent on local rainfall and groundwater for its water supply. Because of the geography and rainfall patterns, the area is prone to prolonged and severe droughts.

Topography within Monterey County ranges from sea level to an elevation of 5,844 feet at Junipero Serra Peak, located 12 miles inland in the Santa Lucia range. The Monterey County climate is generally characterized by warm, dry summers and cool, moist winters. The average temperature is approximately 56 ºF. Average rainfall in the County is approximately 15 inches per year, although rainfall in excess of 30 inches has been recorded. Measurable precipitation averages 51 days per year, and the average length of the growing season is 235 days.

Watersheds

There are two major watersheds that transverse Monterey County, the Salinas River Basin and the Carmel River Basin. The Gabilan and Santa Lucia Mountains are the water sources of the principal watercourses in the region. The Carmel River drains a watershed of approximately 247 square miles, originating in the north-western corner of Los Padres National Forest. The river travels north towards SCD and then flows in a north-northwest direction before emptying into the Pacific Ocean near the town of Carmel-by-the-Sea, California. SCD is located at the confluence of the Carmel River and San Clemente Creek, roughly 15 miles southeast of Carmel-by-the-Sea in Monterey County. Before entering the ocean, the river flows into the Carmel River Lagoon. For a portion of the year, the lagoon is closed by the formation of a sand barrier. The lagoon is open to the ocean in winter months when the river flow is sufficient to open and maintain the river mouth.

Flow patterns of the Carmel River are highly influenced by SCD and the upstream Los Padres Dam.

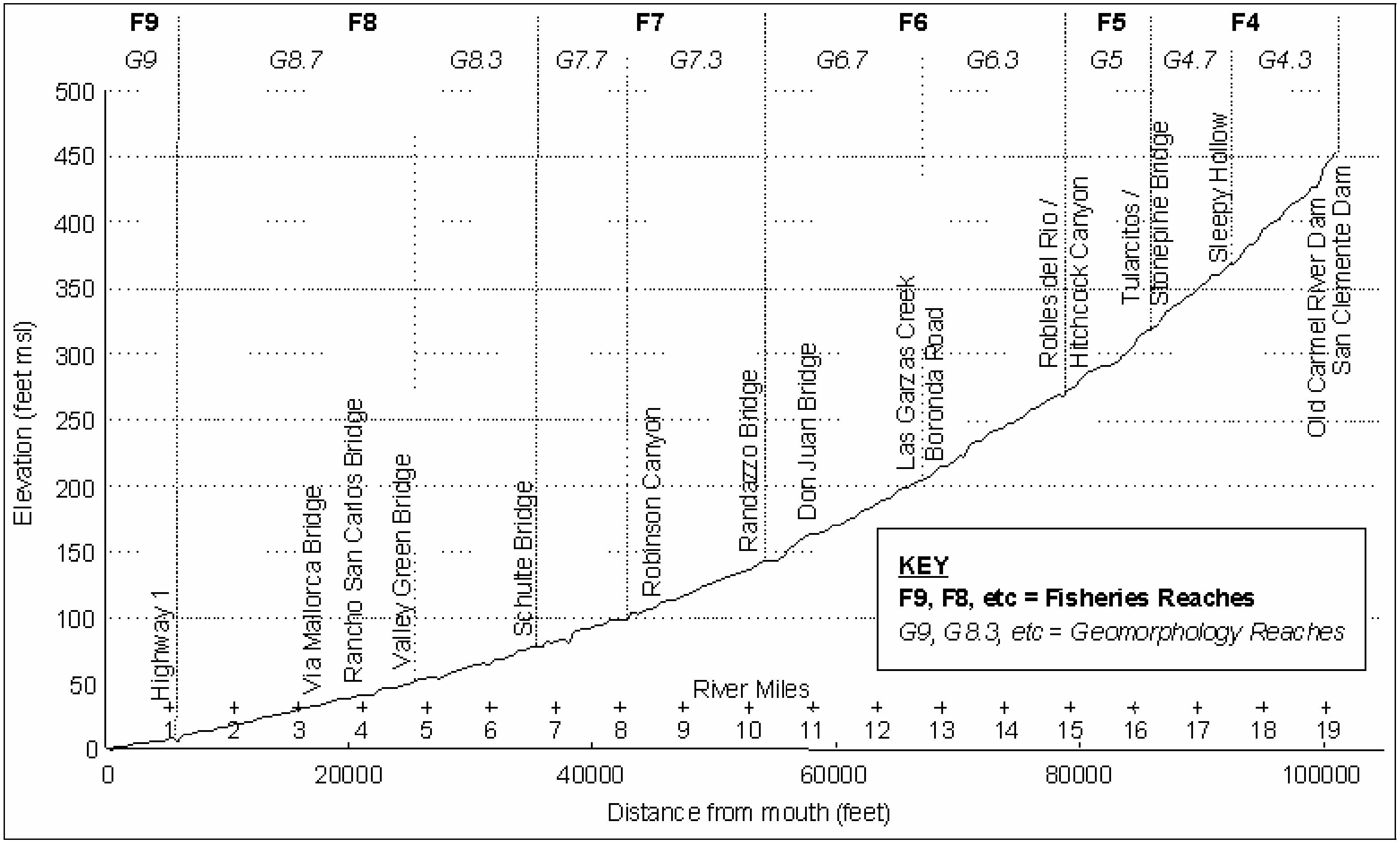
There are a number of smaller watersheds in the county, including the Laguna Seca sub-area watershed and the North County watershed. Drainage patterns in Monterey County have been altered by urbanization, resulting in increased runoff and a greater flood threat. The overall direction of runoff flow in the County is from south to north.

Carmel River Hydrology

The flow regime of the Carmel River is variable depending upon the season and the year. Over 90 percent of the average annual precipitation typically occurs between November and April, with January and February being the wettest months. During the dry summer months from May through October, the inflow to San Clemente Reservoir decreases. The lower reaches of the Carmel River, below SCD, may experience complete or partial drying of the river channel during these months because of groundwater withdrawals and low tributary inflow.

A United States Geological Survey (USGS) gaging station, Carmel River at Robles del Rio (USGS Station #11143200), is located downstream of SCD at subreach 5. Two larger tributaries join the Carmel River between SCD and the gaging station, Tularcitos Creek joins the Carmel River approximately 2 miles upstream of the gaging station and Hitchcock Creek joins just upstream of the gage (Figure 4.2-1). Although the Robles del Rio gaging station is not directly below the Dam, the recorded flows throughout most of the year are representative of the flows over the Dam and are therefore comparable for this analysis.

Figure 4.2-1: Longitudinal Profile of the Carmel River from the Ocean to San Clemente Dam



San Clemente Reservoir is filled nearly to capacity with sediment and has only minor space available to store incoming flows and sediment. The small remaining storage capacity of the reservoir (about 100 AF as measured from the spillway crest) has only minor effects on flows passing through the reservoir and will soon be filled by the natural yield of sediment from the watershed. Differences in discharge between gage flow and flow over the Dam may occur during large flood events and low flow periods, when the gage may over or under estimate the flows over the Dam.[1] Table 4.2-1 and Table 4.2-2 present the average daily flow and the peak of the average daily flow for a month for the period of record at the Carmel River Robles del Rio stream gage. Since 1985, low flow conditions along the lower reaches of the Carmel River have been improved by flow releases from SCD. Flows recorded at the Robles del Rio gage for the low-flow period are now fairly representative of the flows over the Dam.

Stream flow is also measured at the Carmel River Near Carmel gage (USGS Station #11143250), located about three miles east of Carmel-by-the-Sea. The station has monitored flow since water year 1963.

The average monthly flows over a 48-year record (Water Year 1948 to 2005) for the Robles del Rio gage range from 0 cfs to 2,308 cfs in February during wetter months. Flows during drier months, are less variable and range from 0 cfs to an average monthly flow of 410 cfs occurring in May.

Each year, a barrier forms at the Carmel River mouth by wave action, creating a closed lagoon. Under typical conditions, a flow of about 200 cfs is needed at the Carmel River Near-Carmel gage to facilitate opening the lagoon (Dettman 1989), and a flow of about 20 cfs at the Carmel River Near-Carmel gage is needed to keep the river mouth open. In order to provide upstream passage for adult Steelhead through the lower river (from Highway 1 to Robles del Rio), flows of about 45 to 75 cfs are required. These flows are necessary in order for passage to occur at several critical riffles (Dettman 1989).

SCD and Reservoir were never intended for flood control, and the project has neither flood storage nor flood operations criteria. The reservoir has only a minor influence on large magnitude flood events that flow into the reservoir.

The existing dam spillway has the capacity to discharge approximately 20,800 cfs. According to Department of Water Resources/Division of Safety of Dams (DWR/DSOD), during the PMF, the peak flood flow over the Dam would be approximately 81,000 cfs causing excessive scour and erosion around the Dam, and catastrophic failure.

[1] During high flow events, the gage would over-estimate flow over SCD because the gage would include contributions from the two tributaries, and the gage would under-estimate low flows at SCD because it would include diversions from the Russell Wells located upstream of the Tularcitos Creek confluence with the Carmel River.

Table 4.2-1: Average Daily Flow for a Month (cfs) for Period of Record (Water Years 1957-2005)

USGS Gaging Station: Carmel River at Robles Del Rio												
Water Year	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1957	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00
1958	0.3	0.6	14.0	86.0	579.3	636.2	1,071.3	97.4	38.4	9.3	1.7	1.1
1959	1.3	3.1	2.0	61.0	262.3	55.0	15.2	4.5	0.7	0.0	0.0	0.0
1960	0.0	0.0	0.0	7.4	174.7	37.9	18.0	11.8	0.3	0.0	0.0	0.0
1961	0.0	0.0	6.7	5.0	7.1	1.0	2.9	0.5	0.0	0.0	0.0	0.0
1962	0.0	0.0	0.0	0.4	416.9	235.5	56.1	19.8	2.9	0.1	0.0	0.0
1963	4.0	2.6	8.1	153.2	446.5	158.2	375.4	148.5	28.9	8.6	0.4	2.3
1964	2.2	50.0	20.7	107.0	61.6	30.7	32.4	13.5	2.3	0.1	0.0	0.0
1965	0.0	0.0	94.5	264.2	64.9	49.1	162.7	41.3	12.7	0.7	0.0	0.0
1966	0.0	13.5	74.6	99.6	103.9	34.9	7.9	1.1	0.0	0.0	0.0	0.0
1967	0.0	0.0	209.8	250.4	197.4	367.3	514.4	192.8	54.2	1.3	0.4	0.0
1968	0.0	0.0	0.6	6.0	50.4	33.0	15.7	1.0	0.0	0.0	0.0	0.0
1969	0.0	0.0	0.0	768.5	1,205.7	578.6	227.3	76.4	26.3	12.5	0.4	0.0
1970	0.0	0.7	19.8	312.5	106.6	267.8	46.5	25.8	5.5	0.3	0.0	0.0
1971	0.0	12.1	177.5	110.9	42.5	37.9	35.7	20.6	6.9	0.5	0.0	0.0
1972	0.0	0.0	36.2	38.6	51.1	4.0	8.7	0.1	0.0	0.0	0.0	0.0
1973	0.0	40.9	38.9	294.0	753.4	487.3	159.0	61.0	8.5	1.7	0.2	0.0
1974	0.8	17.4	102.7	253.4	77.6	478.7	309.7	72.7	14.7	4.1	0.5	0.2
1975	0.6	1.5	20.4	26.1	465.3	576.9	194.3	77.0	17.6	5.9	0.7	0.5
1976	0.7	1.4	1.5	1.4	1.4	3.5	1.1	0.3	0.0	0.0	0.0	0.0
1977	0.2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1978	0.0	0.0	42.3	573.8	753.8	646.7	285.3	142.3	48.0	10.4	4.3	2.2
1979	4.1	12.7	19.8	84.1	212.3	200.7	162.6	59.3	11.6	5.6	1.4	0.3
1980	0.7	12.2	77.1	519.5	967.4	419.2	175.8	96.4	47.2	15.3	3.4	3.8
1981	4.4	1.7	15.1	148.6	84.5	217.5	96.2	32.7	4.6	1.6	0.7	0.8
1982	3.8	75.4	77.5	415.5	212.8	279.5	828.7	124.8	51.1	11.8	1.9	2.1
1983	2.2	80.9	396.3	744.7	922.1	1,854.5	705.8	409.9	129.1	50.9	13.4	10.6
1984	23.3	135.0	480.5	178.0	91.3	68.5	49.2	24.5	9.5	5.2	3.4	1.3
1985	2.5	29.9	50.6	24.0	61.0	94.9	58.0	15.0	6.1	4.5	1.2	2.1
1986	0.9	2.3	30.8	44.6	1,062.9	713.0	154.1	57.1	12.7	7.4	6.2	6.9
1987	5.7	6.5	7.6	8.2	78.5	65.8	17.0	3.8	3.1	1.5	0.9	1.1
1988	1.4	2.2	4.1	52.4	14.0	7.1	2.5	3.1	2.7	2.1	1.8	1.4
1989	1.8	2.4	6.1	6.4	11.7	53.9	12.4	8.1	1.0	0.9	0.8	1.3
1990	2.1	2.7	2.3	5.1	64.1	25.0	4.0	2.8	1.9	1.5	1.6	1.8
1991	2.1	1.3	0.1	0.3	0.4	282.6	74.8	16.3	8.4	3.2	2.3	2.5
1992	2.9	2.7	5.5	31.0	366.7	156.9	51.0	15.9	5.9	3.2	2.9	3.0
1993	3.1	2.8	17.0	704.6	606.8	295.7	111.9	41.8	33.2	10.5	4.8	4.7
1994	4.3	5.1	6.9	11.5	99.1	34.0	14.6	14.2	5.9	2.4	1.8	2.4
1995	2.8	3.0	4.0	867.8	173.4	1,033.2	203.3	138.2	74.2	27.9	8.9	9.5
1996	8.1	8.7	29.6	77.9	532.6	348.8	137.0	67.4	23.5	12.4	8.1	9.1
1997	7.8	13.2	247.1	898.9	285.4	87.2	46.0	21.9	13.0	11.3	8.4	5.5
1998	3.9	12.6	94.6	473.9	2,308.3	484.9	455.3	236.5	130.4	62.5	31.1	20.0
1999	23.6	37.3	54.7	80.7	232.2	152.7	209.6	69.9	32.4	13.3	6.8	7.2
2000	7.0	9.2	10.2	156.6	529.6	344.0	119.1	54.5	25.4	14.5	9.4	8.1
2001	13.4	15.2	13.6	82.8	172.9	314.2	82.9	48.8	22.3	10.3	5.9	5.7
2002	5.6	10.5	140.5	121.1	60.9	71.8	53.2	30.9	16.3	7.5	4.1	4.3
2003	4.6	41.8	273.8	206.9	76.0	94.0	118.6	104.7	40.0	18.5	11.2	9.1
2004	6.5	7.4	44.0	79.0	269.1	139.3	43.7	23.5	11.3	5.9	4.3	4.7
2005	7.9	17.3	133.8	521.1	404.1	413.3	213.9	103.4	49.8	21.5	13.2	10.0

ND = no data available for these months; data collection began August 1, 1957

Table 4.2-2: Peak Average Daily Flow for a Month (cfs) for Period of Record (Water Years 1957-2005)

USGS GAGING STATION: CARMEL RIVER AT ROBLES DEL RIO												
Water Year	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1957	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00
1958	0.6	0.9	46.0	725.0	1,590.0	1,600.0	4,800.0	160.0	65.0	25.0	2.5	1.9
1959	4.3	7.8	2.6	425.0	1,220.0	136.0	27.0	12.0	1.5	0.0	0.0	0.0
1960	0.0	0.0	0.0	28.0	585.0	60.0	80.0	31.0	1.9	0.0	0.0	0.0
1961	0.0	0.0	14.0	18.0	16.0	8.4	14.0	1.3	0.0	0.0	0.0	0.0
1962	0.0	0.0	0.0	4.8	1,820.0	862.0	106.0	31.0	8.0	0.5	0.0	0.0
1963	24.0	3.9	22.0	3,670.0	2,900.0	564.0	994.0	272.0	82.0	24.0	1.0	19.0
1964	4.3	352.0	34.0	592.0	124.0	65.0	92.0	30.0	18.0	0.4	0.0	0.0
1965	0.0	0.0	452.0	1,040.0	105.0	92.0	322.0	91.0	35.0	3.1	0.0	0.0
1966	0.0	75.0	536.0	386.0	172.0	68.0	28.0	6.2	0.0	0.0	0.0	0.0
1967	0.0	0.0	2,850.0	1,510.0	730.0	1,950.0	915.0	413.0	116.0	2.1	0.7	0.2
1968	0.0	0.0	1.4	118.0	138.0	88.0	61.0	3.7	0.1	0.0	0.0	0.0
1969	0.0	0.0	0.0	3,960.0	3,220.0	1,970.0	414.0	116.0	48.0	31.0	0.7	0.2
1970	0.3	1.6	94.0	1,810.0	205.0	1,020.0	69.0	49.0	11.0	0.8	0.1	0.0
1971	0.0	200.0	779.0	170.0	64.0	125.0	50.0	29.0	14.0	2.5	0.0	0.0
1972	0.0	0.0	287.0	80.0	182.0	11.0	53.0	0.3	0.0	0.0	0.0	0.0
1973	0.0	294.0	54.0	1,250.0	2,280.0	996.0	276.0	88.0	16.0	3.1	0.4	0.0
1974	4.7	79.0	523.0	496.0	110.0	2,100.0	1,320.0	124.0	48.0	14.0	1.0	0.7
1975	3.2	3.1	71.0	39.0	2,890.0	1,760.0	311.0	116.0	44.0	14.0	1.1	0.7
1976	2.4	2.8	1.9	1.7	2.6	29.0	1.7	1.1	0.0	0.0	0.0	0.0
1977	5.0	0.0	0.7	5.5	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
1978	0.0	0.0	510.0	2,780.0	2,510.0	2,320.0	457.0	224.0	86.0	21.0	8.6	3.1
1979	23.0	90.0	44.0	463.0	866.0	736.0	385.0	82.0	37.0	12.0	2.4	1.0
1980	1.3	31.0	557.0	2,750.0	4,130.0	801.0	340.0	128.0	67.0	43.0	5.5	4.7
1981	8.8	1.9	79.0	1,340.0	279.0	634.0	195.0	50.0	10.0	2.3	1.1	3.1
1982	14.0	291.0	320.0	3,010.0	549.0	1,380.0	3,430.0	205.0	79.0	19.0	2.9	7.0
1983	15.0	914.0	2,910.0	4,120.0	2,780.0	6,260.0	2,700.0	1,050.0	183.0	87.0	26.0	36.0
1984	52.0	663.0	2,800.0	418.0	175.0	136.0	76.0	36.0	13.0	8.3	4.2	1.5
1985	3.7	321.0	98.0	37.0	354.0	268.0	141.0	24.0	10.0	9.2	1.7	2.6
1986	2.4	5.8	189.0	275.0	4,130.0	1,910.0	247.0	94.0	18.0	8.8	7.2	8.4
1987	6.6	7.4	9.5	12.0	947.0	161.0	45.0	13.0	3.5	3.6	1.2	1.4
1988	3.1	2.5	9.5	269.0	24.0	22.0	4.8	4.5	3.4	2.6	2.6	1.7
1989	2.4	3.4	31.0	17.0	28.0	201.0	42.0	16.0	2.4	3.4	1.0	1.8
1990	3.4	3.6	2.4	12.0	553.0	39.0	5.4	3.9	2.4	1.7	1.9	1.9
1991	2.9	2.9	0.4	1.7	1.3	1,440.0	202.0	22.0	16.0	7.0	2.7	2.9
1992	4.0	3.1	42.0	80.0	2,090.0	373.0	94.0	22.0	9.9	3.6	3.3	3.5
1993	3.3	3.1	197.0	3,270.0	2,140.0	677.0	180.0	67.0	79.0	20.0	5.5	4.8
1994	4.6	7.1	11.0	47.0	415.0	66.0	18.0	18.0	10.0	2.8	2.3	2.8
1995	3.5	4.0	4.8	5,720.0	374.0	6,500.0	398.0	194.0	102.0	53.0	10.0	11.0
1996	9.7	9.6	66.0	512.0	1,690.0	691.0	285.0	199.0	49.0	16.0	10.0	12.0
1997	8.6	38.0	930.0	2,650.0	692.0	125.0	58.0	30.0	18.0	13.0	10.0	6.4
1998	4.9	73.0	264.0	830.0	9,000.0	912.0	664.0	300.0	180.0	95.0	39.0	25.0
1999	32.0	67.0	115.0	194.0	1,080.0	437.0	426.0	109.0	49.0	20.0	7.6	8.0
2000	7.8	12.0	11.0	1,440.0	2,230.0	657.0	277.0	83.0	39.0	18.0	12.0	10.0
2001	28.0	20.0	14.0	437.0	359.0	1,730.0	138.0	67.0	30.0	15.0	7.7	6.8
2002	7.2	27.0	539.0	439.0	88.0	124.0	76.0	42.0	21.0	11.0	5.2	4.9
2003	5.6	275.0	1,240.0	502.0	101.0	305.0	309.0	174.0	55.0	24.0	13.0	12.0
2004	8.1	8.6	698.0	400.0	1,550.0	401.0	61.0	27.0	19.0	8.0	5.0	5.6
2005	17.0	20.0	2,060.0	1,740.0	1,410.0	1,290.0	354.0	138.0	66.0	33.0	17.0	12.0

ND = no data available for these months; data collection began August 1, 1957

Although dam failure inundation maps under a PMF have not been prepared, it is estimated that an area much larger than the current regulatory floodplain (the regulatory floodplain is based on a 100-year flow), would be inundated (Richard Olebe, pers. comm March 2006).

The capacity of the San Clemente Reservoir is insignificant when compared to the drainage area of 125 square miles upstream of the Dam. Therefore, the existing reservoir has an insignificant effect on routing any large flood event. Low-flows pass through the reservoir largely unchanged from current conditions.

Sediment Sources

Sediment inflow to SCD is influenced by watershed activities or events independent of this project that generate sediment loads. Events that add background (non-project related) sediment load are not affected by project alternatives and project alternatives do not modify these factors in the upstream watershed; each of the alternatives is assumed to be equally influenced by them. However, each of the alternatives must consider the total upstream sediment load as part of the sediment management plan for the lower river.

Typical watershed influences are:

- Natural erosion from runoff and high stream flow;
- Watershed perturbations resulting from floods or fires;
- Land use practices that alter vegetation or disturb the soil; and
- Los Padres Reservoir storage and release of water.

Upstream of the Dam, the Carmel River watershed is much larger than the San Clemente Creek watershed and delivers most of the sediment load that enters the reservoir. MEI (2003) estimated the inflowing sediment load to the reservoir to be on average 16.5 acre-feet per year (AF/yr). The Carmel River branch supplies the majority of this sediment at 15.2 AF/year (MEI 2003). San Clemente Creek provides an average of only 1.3 AF/yr. Sediment is currently stored in both river arms in the reservoir.

The sediment/water interface in the San Clemente Creek arm is located approximately 1,000 feet upstream of SCD. Accumulated sediment in the Carmel River arm approaches the upstream face of SCD at an elevation of about 515, ten feet below the spillway elevation. The accumulated sediment is distributed from the east abutment to the west side of the spillway. Sediment from the Carmel River has also begun to fill the San Clemente Creek arm of the reservoir. At the full reservoir pool (water surface elevation of 525), the sediment/water interface is located about 200 feet upstream of the Dam in the Carmel River arm (see Figure 4.2-2).

Figure 4.2-2: Sediment at the Upstream Face of San Clemente Dam during Drawdown Conditions

Note: Water surface Elevation is about 515.5 on January 24, 2007. Photo by Dave Norris. View is looking upstream on the San Clemente Creek arm from the east side of the spillway

A low flow channel has developed through the delta of stored sediment in both arms, progressing downstream to the reservoir pool.

Watershed perturbations, such as wildfire or landslides can cause substantial amounts of sediment to deposit into the river system. Currently, the majority of the bedload sediment from these large events upstream of the reservoir is deposited in the reservoir and is generally unavailable to the downstream river. Only the suspended load and fine sand is transported over the spillway to downstream reaches.

The transport capacity of the river is a function of the hydraulic conditions in the river and the flow, channel slope and cross-section, and sediment size. Sediment management actions at the Dam can directly influence the amount of sediment delivered to the lower river and indirectly affect local river hydraulics through sediment deposition or scour. Such actions can directly influence steelhead habitat in the lower river.

Prior to the construction of SCD, sediment moved downstream in response to hydraulic conditions (streamflow) and sustained habitat for aquatic invertebrates and fish. Construction of the Dam caused the loss of a continuous sediment supply and ended transport of the coarse bedload sediment fractions (e.g., sand, gravel, cobble and boulder), to the lower river. As a result, downstream habitat degraded as the river continued to move sand, gravel and some cobble further downstream.

These dynamics have modified the channel downstream of SCD. In Reach 4.3, the bed is now composed mostly of cobble and boulder, and very little gravel is present in the river downstream to about the confluence with Tularcitos Creek, which is the current primary source of gravel in the river. The creek provides sediment in varied sizes to the river, including large amounts of sand and gravel during wet-years. Therefore, differences in bed-load supply are most noticeable between SCD and Tularcitos Creek. However, fine sand from SCD may be noticeable downstream as far as River Mile 10 during dry-years, when Tularcitos Creek is not transporting high sediment loads.

Construction of SCD has altered sediment delivery to the river from the Dam to the ocean. As a consequence of the 86-year loss of sediment contributions from the upper watershed, the bed of the river in the Carmel Valley has incised. Downstream land-use has also encroached onto the floodplain, and in some cases, has shortened the river course or restricted the width of the floodplain, reducing the storage capacity for floodwater and sediment deposition in the floodplain. These are existing conditions, not impacts of the present project.

2030 Baseline Conditions

As explained in the introduction to Chapter 4.0, an extended baseline environmental setting has been described for each resource area to the year 2030. This "2030 baseline" describes environmental changes that are expected to occur over the 25 years from the initiation of the EIR/EIS, and is intended to facilitate a more comprehensive analysis, considering trends and changes that may occur in existing conditions over time.

Baseline hydrology would not change over the 25-year period. However, important changes would occur in baseline conditions for sediment transport. The project has accumulated an extensive history of sediment analysis conducted to better understand this dynamic baseline for impact assessment. Appendix M of this report provides a summary of that study history and the approach to sediment transport modeling upon which the environmental analysis presented in this EIR/EIS is based. This appendix defines key terms and concepts, including the "modified baseline", "wet" and "dry" year start to the hydrology, and subreaches used in the modeling. A wet-year start is when the 41-year hydrology is arranged to start with a wet-year and similarly with a dry-year. It also explains how sediment would be divided between the spillway and fish ladder.

To help better understand the 2030 baseline conditions, a summary discussion of how the baseline would be modified under each alternative is presented below so that the reader may more easily compare the alternatives to one another. The impacts of these differences are assessed in Section 4.2.3 for each alternative. Discussions of the remnant pool formed behind SCD, sediment storage in the reservoir area, and reservoir management and management of the upstream low-flow channel are also provided in this section.

Sediment Modeling Baseline

In addition to the 2030 baseline, specific sets of baseline hydrology were used in the sediment modeling. MEI modeled a baseline condition using a 41-year simulation of sediment movement. This baseline represents the condition with the Dam remaining in place. The simulation begins with an assumed 100 AF of storage remaining in the reservoir, which is approximately the condition of the reservoir today. The modeling baseline is therefore essentially synonymous with the 2030 baseline, although the modeling baseline extends out 41 years, a longer period than the 25-year 2030 baseline. However for convenience and to avoid a confusing multiplication of terms, the 2030 sediment modeling baseline is termed simply the "baseline" in the following discussion.

As the reservoir will "fill" with sediment (retaining only a remnant pool, as explained in Section 4.2.1) within 6 to 10 years, MEI developed a "modified baseline" to simulate the effects of sediment management actions under the Proponent's Proposed Project and Alternative 1. Under the modified baseline, the simulation begins with the remaining capacity of the reservoir filled with sediment, with only a remnant pool remaining. The purpose of creating the modified baseline was to allow all the alternatives to be simulated from a common starting point relative to the sediment load that would be available to the river downstream of the Dam. The modified baseline was used only for a single-year simulation (not for the extended period [41-year] hydrology). The term "modified baseline" is used only when it is important to distinguish the use of it in the following discussions.

Comparison of Alternatives Modifications to the Sediment Baseline

Under the baseline, SCD remains in place, and both the Carmel River and San Clemente Creek would continue to contribute sediment to the reservoir throughout the baseline period. The average annual sedimentation rate for San Clemente Reservoir is 16.5 AF/yr (MEI 2003). Since sediment transport is tied to the duration and magnitude of flow, sedimentation rates would be higher in wet-years and lower in dry-years. There is presently about 100 AF of storage available in San Clemente Reservoir, and under the baseline condition, the reservoir would be expected to completely fill with sediment within 6 to 10 years (except for a small remnant pool, as discussed further below). The Carmel River is delivering the bulk of the sediment to the reservoir and the sediment front in the Carmel River has already approached the Dam. The sediment front on the San Clemente Creek arm is several hundred feet from the Dam.

The baseline describes conditions that would characterize the No Project (No Action) Alternative (Alternative 4), since it retains the Dam as currently configured. Alternative 4 includes an annual drawdown for seismic safety under which the reservoir is lowered by 10 feet.[2] Annual drawdowns would continue under Alternative 4 until the reservoir is less than 50 AF in size, but would no longer be needed under the action alternatives. Drawdowns are part of the baseline against which the action alternatives are evaluated, but an annual drawdown is not part of any action alternative.

The Proponent's Proposed Project retains the Dam and varies from the modified baseline only through project operations (sediment management, including sluicing). Sluicing under the Proponent's Proposed Project would somewhat increase sediment released to the lower river above the levels simulated for the baseline condition. This is because operations under the Proponent's Proposed Project will maintain space near the Dam (as a result of sediment management) that temporarily stores new sediment flowing through the system from the watershed upstream. This sediment is removed from this temporary storage as necessary and sluiced downstream. As described in Section 3.2, sluicing is accomplished using a gate through the Dam that can be opened to release sediment and water. Figure 4.2-3 shows the configuration of this gate in relation to the fish ladder.

Alternative 1 would retain a notched dam and would also use sluicing and other sediment management tools.

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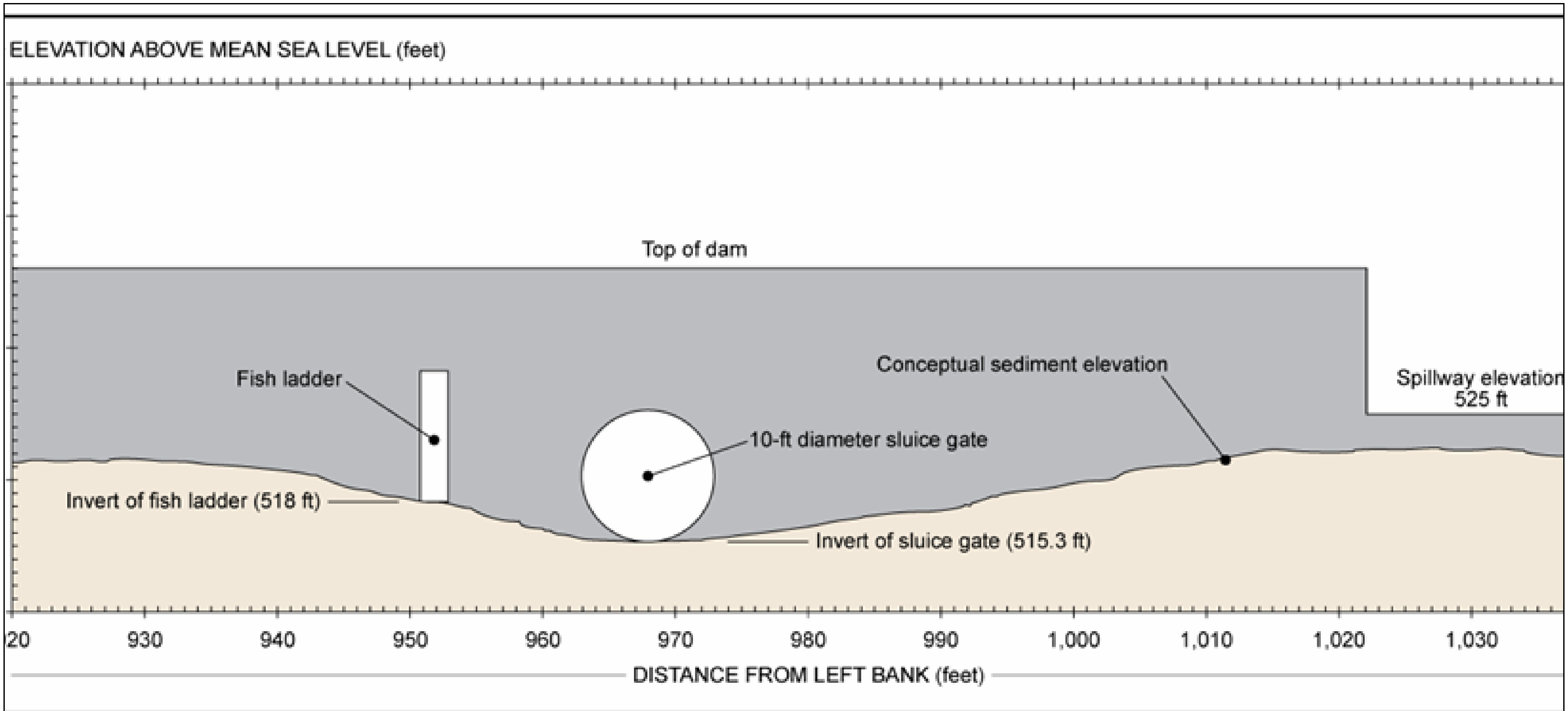
[2] This occurs when flow at the Sleepy Hollow flow-monitoring gage is less than 30 cfs for three consecutive days after April 15. As required by the CDFG in 2006, future drawdowns would not occur until after May 31.

Figure 4.2-3: Sluice Gate and Fish Ladder Configuration



Note: Orientation is looking downstream
Adapted from MEI 2007a

This alternative modifies the baseline somewhat more extensively than does the Proponent's Proposed Project due to sediment excavation associated with dam notching.

Alternatives 2 and 3 remove the Dam, extensively modifying the baseline sediment transport conditions. For consistency, the following discussion refers to the area upstream of SCD that is currently occupied by the reservoir as "the reservoir area" for these alternatives, even though Alternative 2 and 3 remove the Dam and reservoir.

Remnant Pool

At 16.5 AF/yr of sediment inflow, it would take six to ten years to fill the remaining 100 AF of the San Clemente Reservoir. As sediment continues to enter the reservoir, it will fill and eventually reach a point where most of the inflowing sediment is transported through to the lower reaches. Examples of remnant pools in other dams are shown in Figure 4.2-4.

It is important to understand that even under baseline conditions the reservoir will never be entirely "filled" with sediment. Although the elevation of the stored sediment would approach the spillway elevation of 525 feet, it would never quite reach and remain at this elevation. High flows over the spillway produce hydraulic forces immediately upstream of the Dam that disturb bed material, suspend sediment in the water column, and allow sediment to flow over the spillway. The depth of disturbance is a function of flow and associated hydraulic forces. Larger flows tend to cause a greater depth of disturbance. The re-suspended sediment leaves the reservoir and reduces the front to an elevation below the spillway crest. As a result, a remnant pool is always maintained upstream of the spillway.[3]

The sediment elevation upstream of SCD is projected to stay between 2 and 5 feet below the crest elevation of the Dam. The difference in elevation between the sediment near SCD and the controlling point is occupied by the remnant pool. The aerial extent of a remnant pool upstream of SCD would vary from year to year depending on the magnitude of flood flows, and how and where the high flow crosses the Dam. A theoretical section, profile and plan view of the sediment impoundment once it is "full" of sediment is presented in Figure 4.2-5.[4]

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[3] Such a remnant pool can be observed at other dams, such as Daguerre Point Dam on the Yuba River and Sunol Dam on Alameda Creek Figure 4.2-5). Both dams are "filled" with sediment, yet remnant pools are evident just upstream of the dam crests. These dams were designed with broad-crested weirs for which the entire width of the Dam operates as the spillway. At both dams, the stored sediment elevation never equals the spillway elevation.

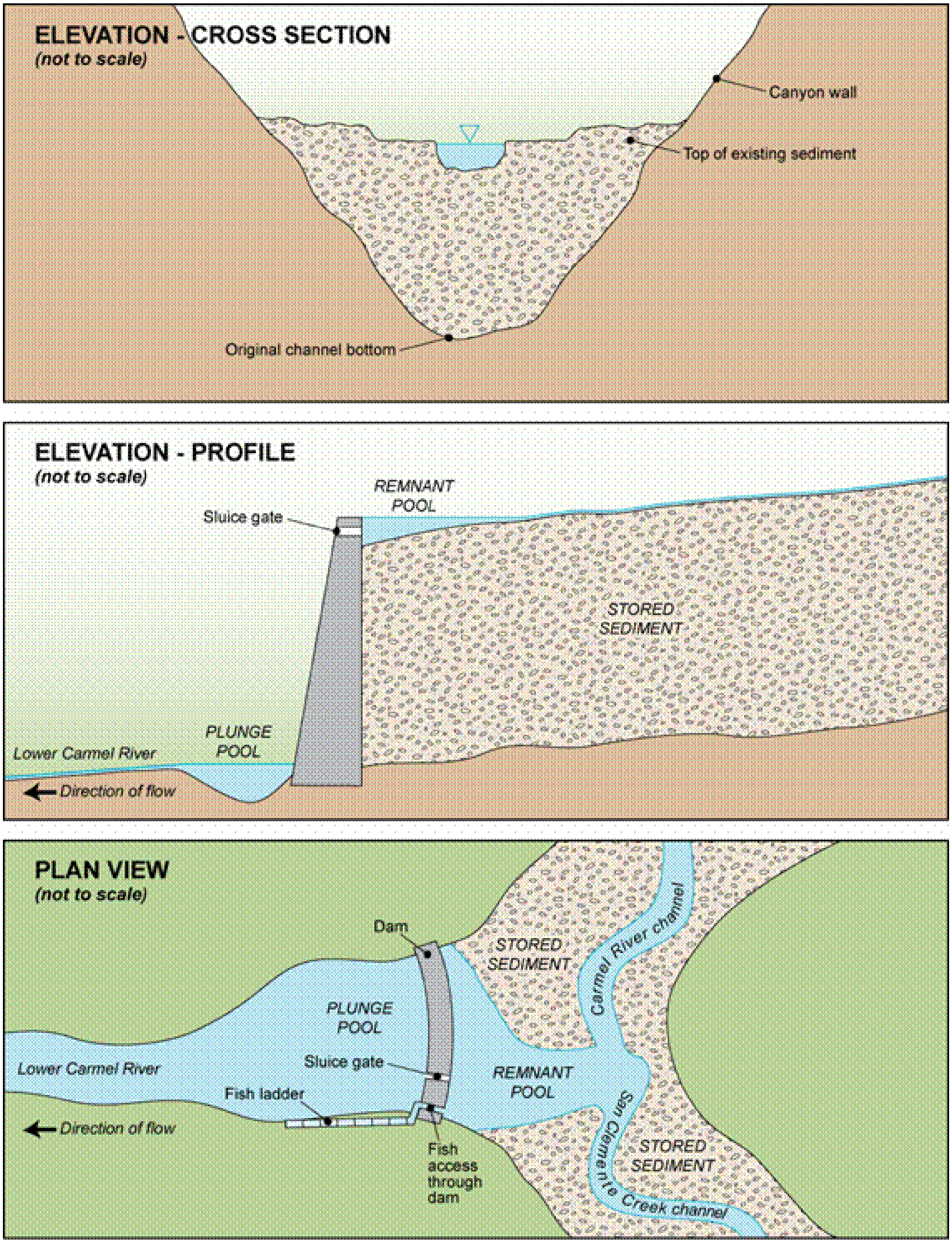
[4] This figure shows impounded sediment as it would look under both the baseline and under the Proponent's Proposed Project. The figure includes a conceptual representation of the sluice gate, which would occur only under the Proponent's Proposed Project.

Figure 4.2-4: Examples of Remnant Pool Upstream of Dams

Daguerre Dam on the Yuba River

Sunol Dam on Alameda Creek

Figure 4.2-5: Conceptual Representations of the Impounded Sediment after Filling



The water surface elevation of the remnant pool is set by the controlling elevation at the Dam. This elevation may be the spillway crest, or other gates used to release water from SCD.

Sediment Storage in the Reservoir

The sediment stored behind SCD consists of fine sands near the face of SCD, coarsening gradually to coarse sands and gravels 2,000 to 2,500 feet upstream (MEI 2007b). The sediment gradation results from the reduction in channel bed slope through the stored sediment. Upstream of the stored sediment in the natural Carmel River channel, the bed slope is about 1.2 percent. Downstream through the stored sediment, the slope decreases to 0.09 percent (Appendix S). The natural bed slope of San Clemente Creek is about 2.5 percent and the slope of the sediment stored there is 0.38 percent.

As the slope flattens, sediment transport capacity is reduced. The largest sediments drop out first, while finer sediments are carried further into the reservoir towards SCD. The sediment gradation through the reservoir is shown in Figure 4.2-6.

Over time, as more sediment is deposited in the upstream end of the reservoir, the local channel slope would become steeper, increasing the sediment transport capacity. This in turn, would cause floodwater to carry coarser sediment further into the reservoir and reestablish the equilibrium of the channel. This would initiate a process of moving coarser materials further into the reservoir.

The stored sediment upstream of SCD extends from the spillway upstream through the former reservoir to a point that is outside the influence of the backwater of SCD. Currently, this point is about 7,500 feet upstream of SCD in the Carmel River arm, and 2,900 feet upstream in the San Clemente Creek arm. The channel at the upstream end of the reservoir on the Carmel River is comprised of gravel, cobbles, and boulders (Figure 4.2-7).

Figure 4.2-7 also shows the formation of a riparian corridor along the river channel. This corridor is forming throughout the former reservoir and is observed within 1,000 feet upstream of SCD.

Reservoir Management and Low-flow Channel

Each year since 2003, during spring or early summer, the surface elevation of the water stored behind SCD is lowered to the drawdown ports at the elevation of 515 feet for seismic safety reasons. When this occurs, the Carmel River and San Clemente Creek each cut a channel through the stored sediment in response to the increasing slope of the water surface.

Figure 4.2-8 and Figure 4.2-9 are photographs taken two years apart at similar locations in the Carmel River. The photographs show the channel cut through the sediment and also show how the bed sediment coarsening has occurred between 2004 and 2006.

Figure 4.2-6: Sediment Gradation through Carmel River Branch San Clemente Reservoir

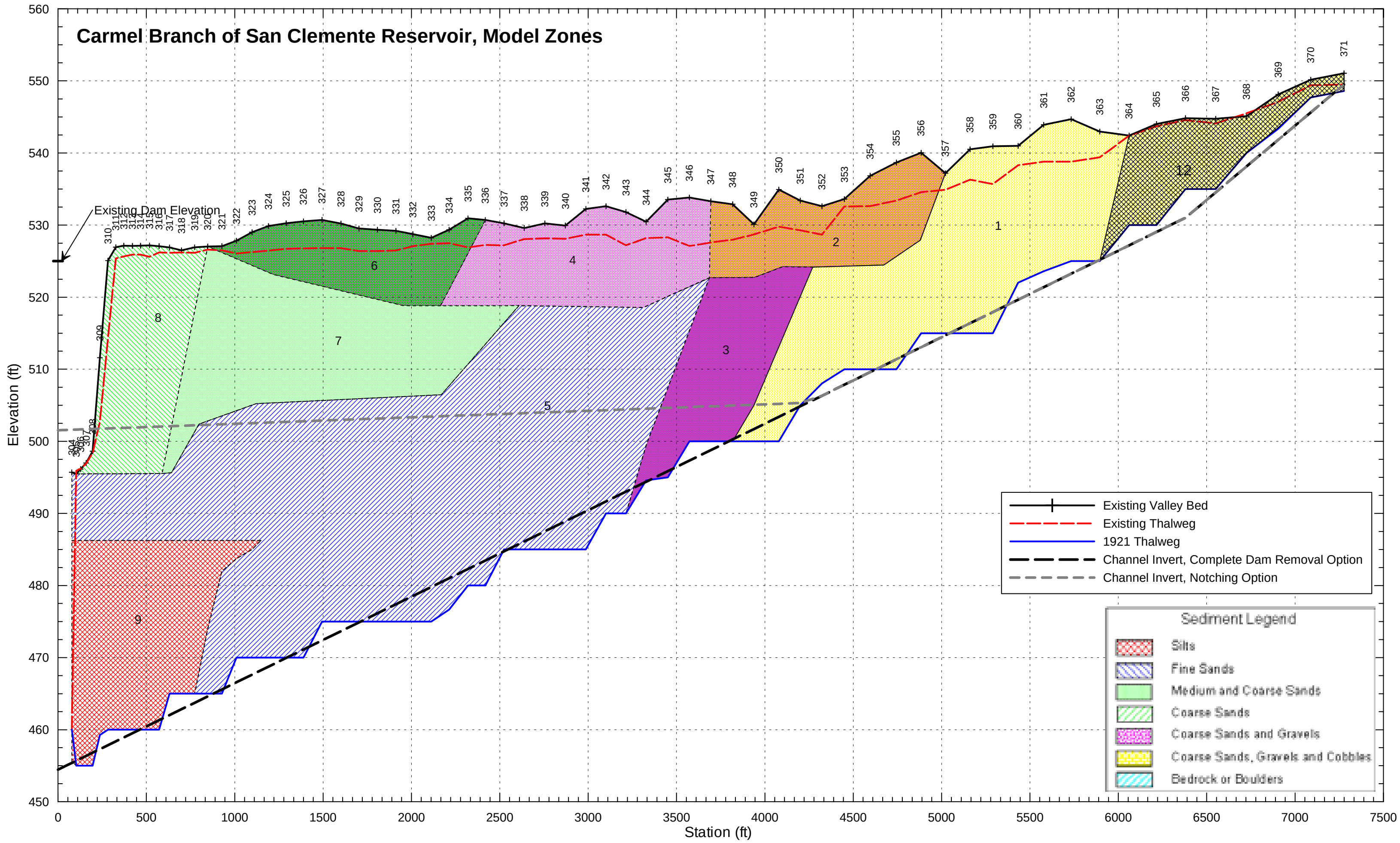


Figure 4.2-7: Carmel River Channel Showing Gravel and Cobble Bed Near the Upstream End of Inundation Zone

Photo Taken July 21, 2006. The flow measured at the Robles del Rio gage downstream is 13 cfs.

Figure 4.2-8: Carmel River in summer 2004, about 2,500 feet Upstream from San Clemente Dam

Photo Taken June 15, 2004, looking upstream through the reservoir. Vegetation established after 1996. The flow measured at the Robles del Rio gage downstream is 11 cfs.

Figure 4.2-9: Carmel River in summer 2006, about 2,300 feet Upstream from San Clemente Dam

Note: Coarser sediment (gravel)

In addition to demonstrating the coarsening of the channel bed, the photographs display a stable channel in low flow conditions. During the winters of 2004 to 2005 and 2005 to 2006, this portion of the channel was inundated in winter because the spillway elevation controls the water surface upstream of the reservoir and these locations are below the spillway elevation. Sediment is deposited in the reach in the high-flow months (November to May) in response to this flooded condition. During the summer drawdown, the lower water surface allowed a channel to cut through this material. After two years of this process, the relatively unchanged waterway demonstrates the size and shape of the characteristic channel for the inflowing sediment and hydrologic conditions. The figures show that channel has reformed over the two years in about the same place and with about the same cross-section.

These photographs also depict woody riparian vegetation that established in 1996 and was 10 years old at the time the photograph was taken. In 1996, the reservoir was operated for the first time without installing stop logs in late spring. Prior to 1996, the stop logs raised the water surface elevation in the reservoir, flooding the area in the figures, thereby preventing vegetation growth.

4.2.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

Hydrology

An action would have a significant impact upon the local or regional hydrology if it would increase the chance of flooding or result in prolonged no-flow periods. For example, an increase in flood magnitude or frequency of flooding downstream of SCD would be a significant impact. For this impact, flooding refers to water leaving the channel to create a hazard to people or property. A significant impact to flooding would generally occur when flood elevations are increased by one foot or more over the base flood elevations as defined by the Federal Emergency Management Agency (FEMA) in the Monterey Country Flood Insurance Study. This one-foot increase is based upon FEMA's Flood Insurance Study criteria and is commonly used to define floodplain encroachment. The 1-foot change is assessed over a reach of river and not just at a single cross section. This is because exceedance of the one-foot criteria at a single cross section may result in localized flooding but exceedance over a reach would be an indication of regional flooding. In addition, changes in hydraulic characteristics (e.g., velocity) that would result in scour or deposition or increase flooding would be significant impacts.

Reservoir Storage

An action would be a significant impact on reservoir storage if it would increase the rate of sediment deposition or scour in the reservoir.

Sediment Transport

An action would have a significant impact upon sediment characteristics within the Project Area if it causes an abrupt change in sediment transport rate, volume of available sediment, or distribution of sediment. In addition, an impact would be significant if it increased sediment transport such that long-term deposition or scour of the Carmel River channel or floodplain would increase base flood elevations by one foot or more. Currently several reaches along the Carmel River are degrading due to lack of coarse sands and gravels (MEI 2003). Actions that increase in the delivery of coarser sediment to the downstream reaches would be a beneficial impact.

Water Supply

Three of the alternatives propose to move the water supply diversion point from the reservoir to a point about 6,000 feet upstream in the Carmel River. The water supply point of diversion will remain at its current location, within the influence of the reservoir for the Proponent's Proposed Project and Alternative 4. It is outside the influence of the reservoir for Alternatives 1, 2, and 3. A relocated point of diversion would take the historic diversion permitted under the existing CAW water right and would require approval of the SWRCB. Moving the diversion upstream would reduce river flow by the diversion amount in a longer section of river than the current diversion location.

Impact Assessment Methodology

Data for impact assessment were compiled from text, tables, and graphs provided by the DWR, Denise Duffy & Associates 2000, MEI Inc. (2003, 2005, 2007a, and 2007b), MWH (2005) and WCC (1997c).

Historical Flow Data

Historical flow data is available for the Carmel River at the Robles del Rio gage and is used to assess the potential for sediment management actions, including sediment sluicing. This historic hydrology is also used as input to the sediment transport model, the results of which were used to assess impacts.

Approach to Sediment Transport Modeling

Appendix M details the approach to sediment analysis and transport modeling. The sediment transport modeling used a HEC-6T simulation of the reservoir upstream of SCD and a HEC-6T model to simulate sediment transport in the lower Carmel River. This model used a 41-year hydrologic period based on measured flow data for the simulations. An independent sluicing model was developed to assess the effects of sluicing sediment past the Dam for the Proponent's Proposed Project. The model results for project alternatives were compared with the modeled baseline condition to assess impacts.

The results of the sediment transport modeling conducted for this EIR/EIS address:

- Total sediment load trapped upstream of SCD
- Total sediment load passing SCD to the Carmel River below the Dam
- Total sediment load stored in the Carmel River below SCD
- Daily suspended sediment concentration in the lower river
- Change in channel bed elevation in the lower river

The results of this modeling were used to help design the alternatives discussed in this Final EIR/EIS. Each action alternative provides for either sediment excavation and disposal off-site, or sediment stabilization in place. Stream restoration design upstream and through the dam site emphasizes the implementation of a geomorphically stable channel.

Model results were used to evaluate sedimentation in the reservoir and the need to manage sediment to maintain the fish ladder. The model results for downstream sediment loading were used to assess the potential to aggrade or degrade the channel bed and influence flooding. The deposition of gravel in the lower river would be a potentially beneficial impact for channel stability and fisheries habitat.

Calculated Suspended Sediment Concentration

The suspended sediment concentration was calculated from the downstream sediment loading results discussed above. A threshold of 500 parts per million (ppm) suspended sediment was used as an indicator of high concentration based on fish sensitivity to suspended sediment. This benchmark was used to organize the modeling results and the implications of the concentration are discussed in the Water Quality and Fisheries Sections of this report.

4.2.3 IMPACTS AND MITIGATION

The following impact issues have been defined for hydrology and water resources:

- WR-1: Changes in Stream Flow during Construction (Changes in streamflow downstream of the Dam during construction drawdown, dewatering the plunge pool, or when inflow exceeds the bypass capacity)
- WR-2a: Changes in Sediment Flow Passing SCD Immediately after Construction (Changes in the amount of sediment transported from the upper watershed (above SCD) to the lower Carmel River (below SCD) immediately after construction).
- WR-2b: Changes in Sediment Storage and Composition in the Lower River during Construction (Changes in the sediment composition of the Carmel River below SCD) (modified to clarify and amplify the impact issues in WR-3 and WR-4 of the Draft EIR/EIS to address construction related issues)

- WR-3a: Change in Sediment Deposition in the Reservoir (Changes in the amount of sediment deposited in the reservoir upstream of SCD) (modified to clarify and amplify the impact issue in WR-2 of the Draft EIR/EIS to address ongoing operational issues)

- WR-3b: Increased Sediment Deposition that Obstructs Fish Passage (During low-flow years, when all the flow is through the fish ladder, sediment would move close to the fish ladder, and possibly impair fish passage from the ladder to the remnant pool) (modified to clarify and amplify the impact issue in WR-2 of the Draft EIR/EIS to address ongoing operational issues)

- WR-4a: Increased Sediment Deposition in the Lower River (The increased sediment load passing SCD depositing in the Carmel River bed below SCD) (modified to clarify and amplify the impact issues in WR-2 and WR-4 of the Draft EIR/EIS to address ongoing operational issues)

- WR-4b: Increase in Frequency of High Suspended Sediment Concentrations (High flows will increase the sediment concentration in the river and sediment management activities, such as sluicing, would further increase the suspended sediment concentration downstream of the Dam) (modified to clarify and amplify the impact issue in WR-2 of the Draft EIR/EIS to address ongoing operational issues)

- WR-5: Changes in Channel Bed Geometry (Additional sediment passing the Dam to the lower river would aggrade or degrade the river channel or change the channel cross sections)

- WR-6: Changes to the 100-year Flood Elevation (The increased sediment loading would alter the bed of the Carmel River and influence the 100-year flood elevation)

- WR-7: Impact to the Location or Timing of Water Supply Diversions (Changes to the location or timing of water supply diversions)

- WR-8: Increased Risk of Dam Failure (Risk of dam failure due to seismic activity or flooding, leading to or increasing downstream flooding)

Based on comments received on the Draft EIR/EIS, additional sediment transport modeling was performed for this Final EIR/EIS. The modeling helped refine the understanding of the need for sediment management immediately upstream of the Dam and assisted in describing the impacts associated with the change in sediment loading to the lower river as a result of management actions. Furthermore, the modeling helped describe the magnitude of the changes in sediment flow because of the alternatives. Because of the improved understanding of the sediment flow that would result from the alternatives and the sediment management actions, hydrology and water resources impacts were reassessed and may now differ from those described in the Draft EIR/EIS.

The differences in impact issues described in the Draft EIR/EIS and in this Final EIR/EIS are as follows:

- A distinction has been made between the construction-related impacts (WR-1, WR-2a, and WR-2b) and the operational or continuing impacts (WR-3 through WR-6). The construction related impacts, which are usually short-term impacts, relate to effects during or immediately after construction and were evaluated from the sediment transport modeling results of the one-year simulation. Such impacts are primarily caused by disturbing the sediment upstream of SCD or by temporarily rerouting flow to bypass construction activities. The operational or continuing impacts which are usually long-term impacts relate to effects that could occur over years or decades and were assessed by evaluating the model results for the 41-year simulation. They are caused primarily by changes in flooding frequency or sediment loading as a result of a project alternative. They may be intermittent and temporary.

- In the Draft EIR/EIS, several factors were sometimes aggregated within a single impact issue. In the Final EIR/EIS, these impacts have been disaggregated and related back to the primary causative factor. Therefore, in the Draft EIR/EIS, Impact WR-2 (Changes in Sediment Flux Passing the San Clemente Dam Site) was described as including changes in sediment flow as a result of construction and as a result of sediment management to mitigate for fish passage problems from the fish ladder. In the Final EIR/EIS, WR-2a (Changes in Sediment Flow Passing SCD Site Immediately after Construction) only addresses the changes in sediment flow caused by construction. The additional modeling was used to clarify the magnitude of the impact and shows that for the Proponent's Proposed Project and Alternative 1, these changes are relatively small and were determined to be less than significant instead of less than significant with mitigation. For Alternatives 2 and 3, the impacts were determined to be significant and unavoidable instead of less than significant with mitigation.

- Impact WR-3 (Changes in Riverine Sediment Composition) and WR-4 (Riverine Sediment Storage) in the Draft EIR/EIS described both short and long-term impacts. These temporal impacts are now described separately in the Final EIR/EIS. The discussion of short term impacts of both of these impact issues are now in WR-2b (Changes in Sediment Storage and Composition in the Lower River during Construction). The additional modeling results were used to clarify the magnitude of this impact. Impacts for the Proponent's Proposed Project and Alternative 1 are now less than significant with mitigation instead of significant and unavoidable and impacts for Alternatives 2 and 3 would still be significant and unavoidable.

- In the Draft EIR/EIS, sediment management was viewed as mitigation to manage sediment to maintain the fish ladder. The updated sediment transport modeling was used to amplify the information in the Draft EIR/EIS and it was determined that under the Proponent's Proposed Project sediment management for fish passage would only be needed occasionally and not as a regular practice. Sediment management as presented in the Final EIR/EIS is an adaptive management tool that would be used when necessary to maintain passage from the fish ladder into the remnant pool. The discussion of the long-term impacts of sediment management in this Final EIR/EIS, including slucing, is found in WR-3a (Change in Sediment Deposition in the Reservoir), WR-3b (Increased Sediment Deposition that Obstructs Fish Passage), WR-4a (increased Sediment Deposition in the Lower River) and WR-4b (Increase in Frequency of High Suspended Sediment Concentrations). In the Draft EIR/EIS, sediment management, including sluicing, was a significant and unavoidable impact for the Proponent's Proposed Project and Alternative 1. The results of the updated sediment transport modeling (and changes made to the SOMP to make it more adaptive for the Proponent's Proposed Project and Alternative 1) resulting in impact designations that are now either beneficial or less than significant for all action alternatives except for Alternative 2 under WR-4a and Alternatives 2 and 3 under WR-4b.

- In this Final EIR/EIS, Impact Issues WR-3a (Change in Sediment Deposition in the Reservoir) and WR-3b (Increased Sediment Deposition that Obstructs Fish Passage) modify the description of the long-term impacts found in Impact WR-2 of the Draft EIR/EIS. For the Proponent's Proposed Project and Alternative 1, these impact issues consider the condition of sediment buildup in the reservoir with possible obstruction of the upstream fish ladder entrance. Impact Issue WR-3a considers the buildup of sediment in the remnant pool and WR-3b (Increased Sediment Deposition that Obstructs Fish Passage) considers the potential blockage at the fish ladder. For Alternatives 2 and 3, these impact issues consider sediment deposition upstream of the area where the Dam would be removed.

- In this Final EIR/EIS, Impact Issue WR-4a (Increased Sediment Deposition in the Lower River) modifies the description of long-term impacts discussed in the Draft EIR/EIS as WR-2 (Changes in Sediment Flux Passing the San Clement Dam Site) and WR-4 (Riverine Sediment Storage) based on additional sediment transport modeling. Impact issue WR-4b (Increase in Frequency of High Suspended Sediment Concentrations) in this Final EIR/EIS also modifies the description of long-term impacts discussed in the Draft EIR/EIS as WR-2 (Changes in Sediment Flux Passing the San Clement Dam Site) and WR-4 (Riverine Sediment Storage) and uses information from the additional sediment transport modeling to describe the suspended sediment concentration for each of the alternatives. These impacts are all downstream of the Dam or the dam site.

- In this Final EIR/EIS, impact issue WR-5 is the same as the Draft EIR/EIS Impact Issue WR-5 (Changes in Channel Bed Geometry). Impact Issue WR-6 (Changes to the 100-year Flood Elevation) in this Final EIR/EIS is similar to the Draft EIR/EIS impact issue WR-6 (Changes to the 100-year Floodplain). Some changes have been made to the impact determinations for these impacts based on the results of the additional modeling. For the Proponent's Proposed Project, it was determined that the impact was less than significant because the increase in elevations were less than one foot and mitigation would not be required. For Alternatives 1 and 3, there were changes that showed that elevation increases would be greater than 1 foot, but the changes in channel bed elevation and the 100-year flood elevations would be localized and not extensive and therefore would not have a significant impact. For Alternative 2, it was determined that the impacts would be significant and unavoidable because simulations show the change was greater than one foot for numerous cross sections.

- WR-7 (Impact to the Location or Timing of Water Supply Diversions) is the same as WR-7 (Water Supply) in the Draft EIR/EIS.

- Impact issue WR-8 (Increased Risk of Dam Failure) is the same as WR-8 (Dam Failure) in the Draft EIR/EIS.

- Additional appendices for this section have been created to address the comments Received on The Draft EIR/EIS. The appendices Include Appendix J, Sediment Operation And Management Plan For Fish Passage; Appendix M, Sediment Transport Modeling, Appendix O, Suspended Sediment Concentration Associated with A Sluice Event; Appendix P, Suspended Sediment Concentration Exceedance for the Alternatives, and Appendix S, MEI Studies on Sediment Suicing.[5]

Sediment Transport Modeling Summary Results

The results of the sediment transport are described below for each alternative. This section summarizes and compares the sediment Impact Issues (WR-3a, WR-4a, and WR-4b) for each alternative. This comparative information has been added in response to comments received on the Draft EIR/EIS.

The sediment transport analysis focuses on three evaluation criteria: reservoir sedimentation (WR-3a and 3b), sediment loading (WR-4a), and downstream sediment concentration (WR-4b). These criteria are described in Appendix M. The modeling results for each of these criteria are discussed for the 41-year simulation period (in the case of sluicing, the results are discussed for the one-year simulation [i.e., only a single year was simulated], as described in Appendix M).

Table 4.2-3 compares total sediment load under both wet- and dry-year hydrology for all project alternatives. In general, the most sediment would be stored under the baseline condition, which also reflects conditions for the Proponent's Proposed Project and Alternative 4. The least amount of sediment would be stored in the reservoir area under Alternative 2, which would dispose of all excavated sediment offsite (see Appendix M for a discussion of the sediment volume that cannot be removed by excavation).

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[5] Note: Appendix I of the Draft EIR/EIS is now included in Appendix S of this Final EIR/EIS

Table 4.2-3: Total Simulated Sediment Load (AF) for all Alternatives

	Baseline, Proponent's Proposed Project, and Alternative 4		Alternative 1		Alternative 2		Alternative 3	
Sediment Load	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**	**Wet**	**Dry**
Trapped In Reservoir	168	177	89	100	4	3	97	117
Passing SCD	506	496	585	573	669	670	576	556
Stored in Lower Carmel River	57	51	58	60	170	123	73	57

Source: MEI 2007
Note: Wet and Dry refer to the full 41-year hydrology that has been organized to start with a wet-year or a dry-year

For 86 years, the lower river has seen a reduced sediment supply because the Dam has trapped the sediment. The efficiency of the trapping has reduced over time and would approach 22 percent in about 40 years. The Proponent's Proposed Project and Alternative 1 would introduce additional sediment downstream through sluicing. Alternative 2 would remove the Dam and therefore, the annual natural sediment load in the river upstream of the Dam would flow downstream, but not all accumulated sediment could be removed from the system. Sediment from the canyon walls of the former reservoir that could not be excavated would also flow downstream and canyon walls could erode until they are stabilized with vegetation. This would add additional sediment to the natural background load. Alternative 3 would allow most annual natural sediment load to pass downstream, but sediment would continue to deposit upstream of the Carmel River bypass channel. Accumulated sediment downstream of the bypass would be stabilized in place in the Carmel River arm and not be available for transport.

Sediment modeling examined potential streambed adjustments, yielding projected changes in streambed elevation relative to the baseline condition. In general, changes in streambed elevation would be localized and would not occur consistently over an entire river reach. Alternative 2 would result in the most occurrences of increased streambed elevation of all the alternatives. This result does not mean flooding would occur, but does reflect an increased opportunity for floodwater to break out of the channel.

With the additional sediment moving downstream, suspended sediment concentrations would be highest under Alternative 2. Table 4.2-4 indicates the number of days that the concentration of suspended sediment exceeds 500 ppm, a threshold chosen to reflect potential impacts to fish (see discussion in Section 4.2.3 and 4.4.3).

The frequency of such exceedances would be highest for Alternative 2; the other alternatives are similar to one another. However, in all cases these results represent the number of days in a 41-year simulation and therefore represent a small percentage of the total simulation period. Appendix P plots the exceedance results shown in Table 4.2-1 by stream reach, comparing each project alternative with the modified baseline.

Table 4.2-4: Number of Days with Simulated Suspended Sediment Concentration Exceeds 500 ppm for all Alternatives

Wet-year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	R4.7	R5	R6.3	R6.7	R7.3	R7.7	R8.3	R8.7	R9
Baseline, Proponent's Proposed Project	22	21	24	28	30	32	33	30	33	31
Alternative 1	23	23	25	29	36	38	37	30	33	37
Alternative 2	49	42	40	39	45	47	41	35	38	40
Alternative 3	33	29	30	34	38	42	38	33	36	35
Dry-year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	R4.7	R5	R6.3	R6.7	R7.3	R7.7	R8.3	R8.7	R9
Baseline, Proponent's Proposed Project	27	23	28	30	38	42	40	35	36	33
Alternative 1	23	23	30	31	36	38	40	33	35	36
Alternative 2	41	35	40	38	41	43	44	38	41	39
Alternative 3	27	27	29	33	38	38	38	33	38	37

Note: Reach 4.3 is immediately below SCD. Reach 9 is at the lagoon. Simulation period is 41 years, starting with a wet-year or a dry-year.
Source: MEI 2007b

Proponent's Proposed Project

Issue WR-1: Changes in Streamflow during Construction

Changes in streamflow downstream of the Dam during construction drawdown, dewatering the plunge pool, or when inflow exceeds the bypass capacity
Determination: ***less than significant, no mitigation required, short-term***

IMPACT

For the Proponent's Proposed Project, the reservoir water surface elevation would be drawn down[6] approximately 15 feet, from an elevation of 525 feet to 510 feet to facilitate construction activities at the Dam. The drawdown would be accomplished by opening the upper and mid-level intake gates. The river would be diverted through a 50 cfs capacity bypass pipeline beginning upstream of the reservoir and discharging to the Carmel River at a point approximately 500 feet downstream of the Dam. Drawdown would begin once flows through the reservoir are at or below 50 cfs for three consecutive days. The date on which drawdown could begin would be constrained by biological requirements, seasonal rainfall, and river flows. It is expected that about six weeks would be required for installation of the diversion pipe and drawdown. Reservoir drawdown and dewatering is planned to be completed during CY 4.

To lower the water level in the reservoir, approximately 75 AF of stored water would be released though the Dam outflow gates at elevations 514 feet and 494 feet. Sediment would be removed to expose the mid level intake gate (494 feet) in order to continue to lower the water level. Water quality effects of this action are discussed in Section 4.3.3. Once the project is complete, the reservoir would be allowed to refill with runoff and the water surface would be maintained around the 525-foot elevation.

[6] This lowering of reservoir elevation for construction or, under other alternatives, demolition of the Dam, as described here and subsequently throughout this chapter, is not synonymous with the annual draw-down currently implemented as an interim safety measure, as ordered by DSOD and described in Chapters 1.6, 3.2.3 and 3.6.

During the construction drawdown, water released from SCD would include the natural inflow to the reservoir plus water released from storage. The Carmel River would experience slightly higher short-term outflows (as compared to inflows) during the construction period. The short-term impact would be to increase downstream flows by about 2 cfs during the 20-day drawdown period. This would have a less than significant beneficial impact to the Carmel River hydrology.

Water also would be removed from the plunge pool at the toe of the Dam prior to construction. Water from the plunge pool would be released downstream after the upstream diversion and reservoir drawdown is complete. Approximately 0.1 AF of water is stored in the plunge pool. The amount of water stored within the pool would be small and would have a less than significant impact to the Carmel River hydrology.

MITIGATION

The volume of water released from the reservoir for construction drawdown would not appreciably increase the downstream flow. No mitigation would be required.

Issue WR-2a: Changes in Sediment Flow Passing SCD Immediately after Construction

Changes in the amount of sediment transported from the upper watershed (above SCD) to the lower Carmel River (below SCD) immediately after construction
Determination: ***less than significant, no mitigation required, short-term***

IMPACT

In the Draft EIR/EIS, Impact Issue WR-2 covered both construction and operational impacts. In this Final EIS/EIS, Impact Issues WR-2a and WR-2b are confined to discussion of construction impacts. Operational impacts are covered in Issues WR-3a, WR-3b, WR-4a, and WR-4b.

Construction of the Proponent's Proposed Project would involve excavation of sediment from upstream of SCD to allow access to the Dam. The sediment removal during construction under the Proponent's Proposed Project would be minimal compared to the sediment removal required for Alternatives 1, 2, and 3. However, the sediment removal under the Proponent's Proposed Project would increase the available storage area upstream of the Dam and would trap additional sediment immediately after construction. This would reduce the sediment load passing SCD to the lower river by increasing the trap efficiency.

MITIGATION

In the Draft EIR/EIS, Impact Issue WR-2 was less than significant with mitigation. However, the mitigation identified was for operational changes covered in WR-3a, WR-3b, WR-4a, and WR-4b of this Final EIR/EIS.

After completion of construction, the area where sediment has been excavated would fill in through natural sediment transport, leaving only a remnant pool. Based on the sediment transport modeling, the remnant pool would be about 5 to 10 AF in size and would result in a trap efficiency of about 22 percent. This is similar to the baseline and no mitigation is required.

Issue WR-2b: Changes in Sediment Storage and Composition in the Lower River during Construction

Changes in the sediment composition of the Carmel River below SCD
Determination: ***less than significant with mitigation, short-term***

IMPACT

In the Draft EIR/EIS, Impact Issue WR-2 covered both construction and operational impacts. In this Final EIS/EIS, WR-2a and WR-2b covers construction impacts that were included in Impact Issues WR-3 and WR-4 of the Draft EIR/EIS. Operational impacts are covered in Issues WR-3a, WR-3b, WR-4a, and WR-4b.

During construction of the Proponent's Proposed Project, additional sediment may be released downstream from the construction activities, largely because of vegetation removal exposing bare soil during construction. Because the construction activity would occur in the low-flow period when sediment transport is low, construction-period sediment releases would be primarily fine sand rather than gravel. Sediment releases may continue after construction until vegetation is re-established on bare surfaces exposed by construction activities.

Immediately after construction, if the trap efficiency has increased because of construction (see issue WR-2a), the composition of the sediment passing the Dam would change and the amount of coarse sands and gravels would decrease as compared to baseline.

MITIGATION

In the Draft EIR/EIS, Impact Issue WR-3 was short-term, significant, and unavoidable; long-term, less than significant with mitigation, and potentially beneficial. However, the impacts and mitigation identified result from operational changes which are no longer part of this issue and are covered in WR-4a and WR-4b.

As described below in the mitigation discussion for water quality (Section 4.3), a diversion facility would be installed to hold turbid water until sediment has settled out sufficiently that the water can be released downstream. The effects of vegetation removal for construction would continue to affect sediment composition until vegetation is reestablished. Based upon visual accounts of regeneration at the site, vegetation would be established within one to two years following construction. With the mitigation measures discussed, this impact would be less than significant.

Issue WR-3a: Change in Sediment Deposition in the Reservoir

Changes in the amount of sediment deposited in the reservoir upstream of SCD
Determination: ***less than significant with mitigation; potentially beneficial, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues, WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including sluicing activities that were discussed in WR-2, WR-3, and WR-4 in the Draft EIR/EIS.

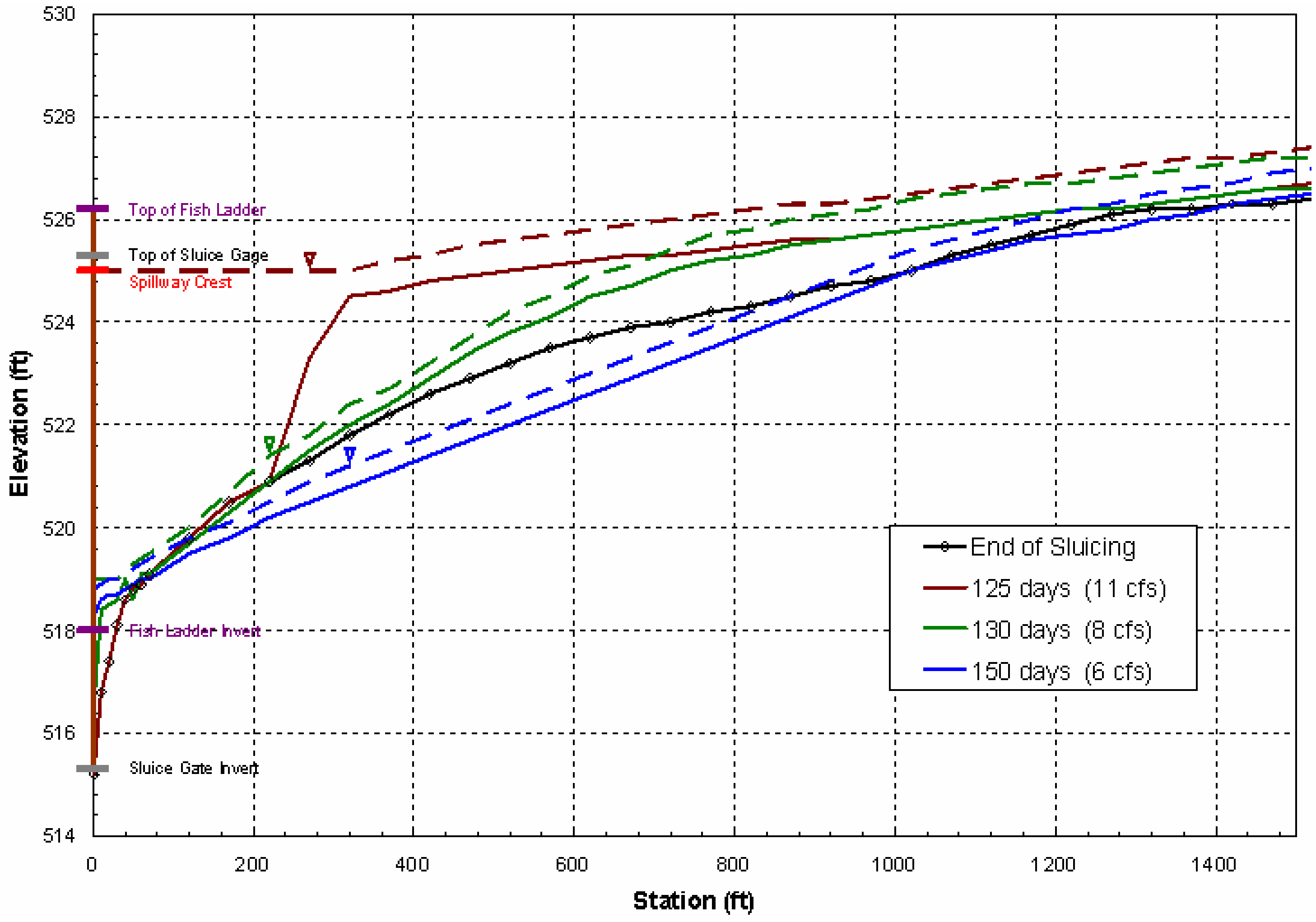
The trap efficiency of the reservoir would decrease over time from the current level of 75 percent to about 22 percent. The efficiency would decrease further with sediment management activities detailed in the SOMP (Appendix J). Sluicing under the Proponent's Proposed Project would decrease the trap efficiency of the reservoir to a range of 15 to 17 percent. As the trap efficiency declines, additional sediment would be available downstream relative to the amount that was present under baseline conditions.

Sediment sluicing simulations suggest that sediment management in the remnant pool can be improved by controlling the water surface elevation and directing the water and sediment flow over the spillway. To direct the water over the spillway, the water surface elevation must be maintained at the spillway elevation. Simulations were conducted assuming the fish ladder opening was reduced so that a maximum of 10 cfs would pass. This flow would be sufficient to allow fish passage and would force additional flow above 10 cfs over the spillway. Figure 4.2-10 shows the results of the single-year dry-year simulation with the fish ladder operating at 10 cfs.

Under this dry-year condition, the flow would go over the spillway for up to 125 days after the sluice event (June 14) and the sediment wedge[7] would be about 300 feet from the spillway. After the flow drops to less than 10 cfs, the flow would go through the fish ladder and the sediment would be carried downstream.

[7] The term "wedge" is used here and throughout this chapter to refer to the accumulated sediment behind the Dam. It does not refer to a slug of sediment released downstream.

Figure 4.2-10: Simulated Channel Invert Upstream of Dam up to 150 Days after the Sluice Event for a Dry-year with the Fish Ladder Operating at 10 cfs



Source: MEI 2007b.
Note: Dashed line represents the water surface elevation corresponding to the channel invert of the same color. The sluice was simulated to occur on February 9, 1985.

The division of sediment between the spillway and the fish ladder is shown in Figure 4.2-11, Figure 4.2-12 and Figure 4.2-13. Sediment is simulated to move over the spillway and through the fish ladder. Sediment flow through the fish ladder is related to low-flow conditions and would occur in a wet-year after June. In a dry-year, flows would drop below the ladder capacity and all the flow would go through the ladder as early as March. This dry-year condition can be addressed by reducing the ladder flow and maintaining spillway control over the water surface elevation in the remnant pool.

Modeling also indicated that the initial bed profile from the two-hour sluice would not optimize sediment removal from the remnant pool. The simulated bed profile after 150 days would be lower than the profile at the end of the sluice. This reflects additional sediment moving through the fish ladder that could have moved through the sluice gate if a longer sluicing event were implemented.

As a result of comments received, the SOMP was revised to include tools other than sluicing to manage sediment in the remnant pool for fish passage (see the SOMP, Appendix J). In each case, sediment management would occur during the low-flow period of August through October. Sediment may be mechanically dredged or suction dredged from the remnant pool. This material would be dried and hauled or stockpiled for future flood flows to mobilize and convey over the Dam.

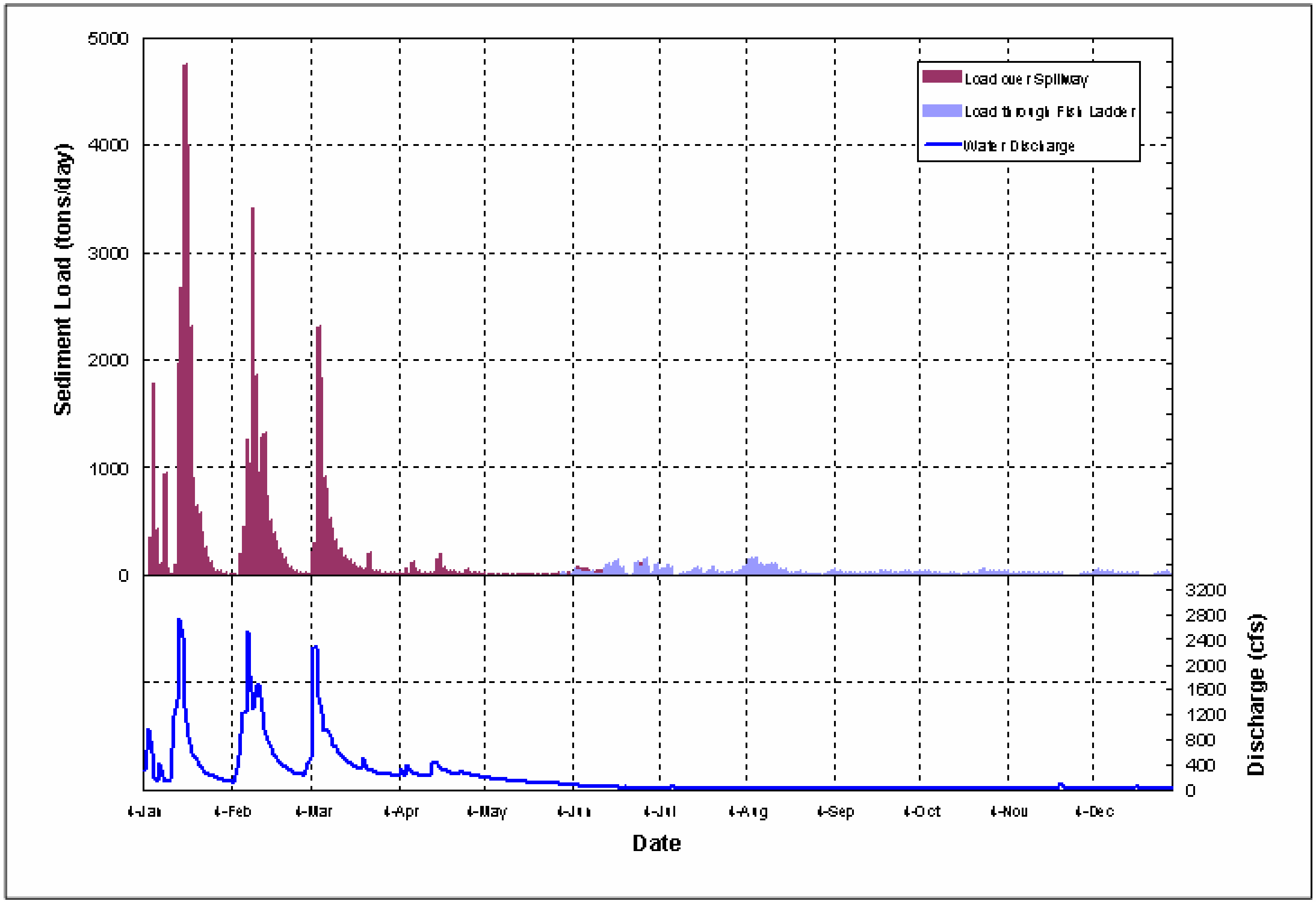
Drying the sediment would be accomplished by placing the wet material in a bermed area within the existing reservoir area, higher than the active flow channel. This material would be screened for different sediment size classes and would be available for injection into the river downstream.

Gravel injection is used below dams on several California rivers as a means of replenishing certain gravel sizes that are absent from the natural sediment flow.

MITIGATION

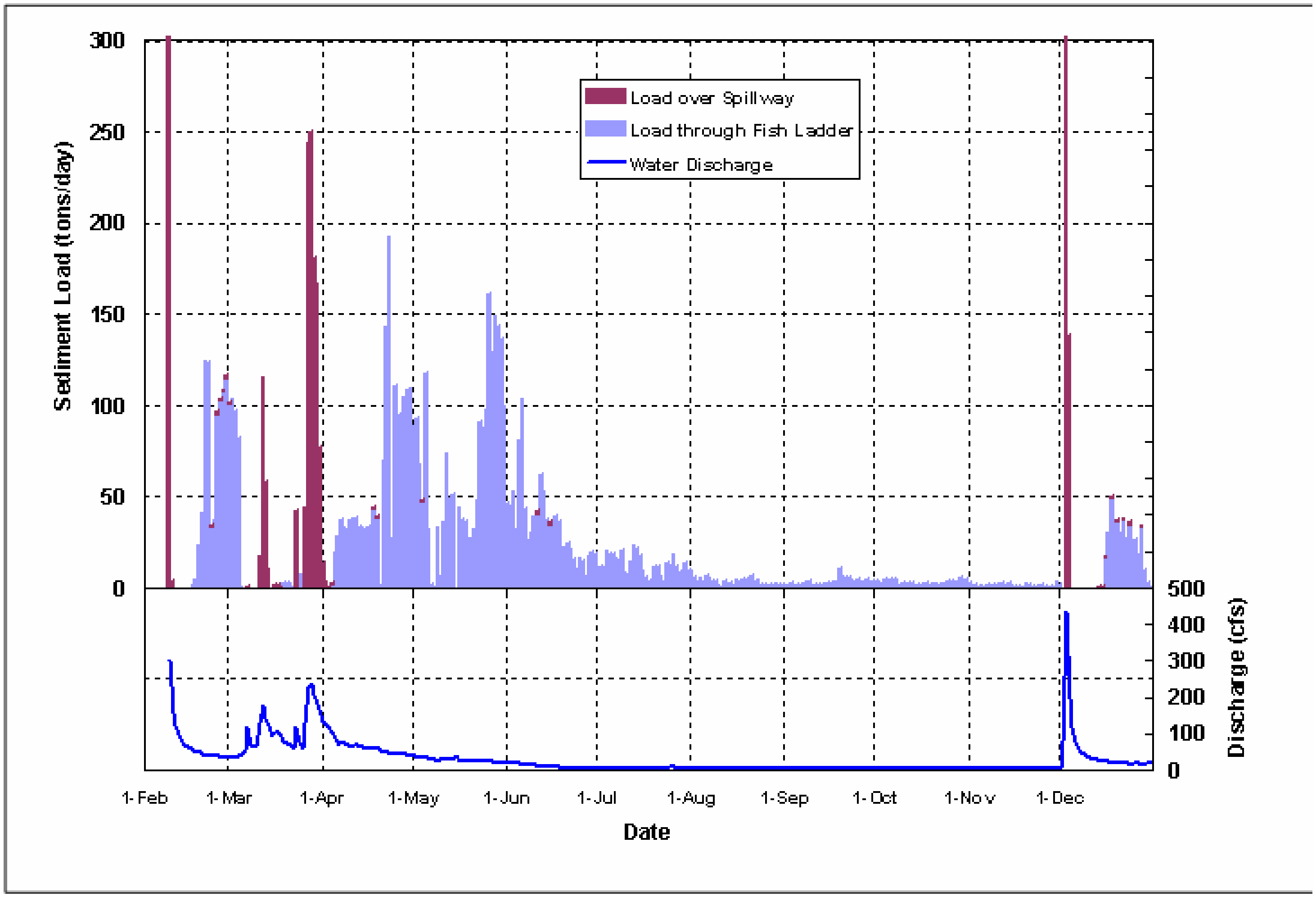
Implementation of the SOMP would improve the sediment conditions for fish passage upstream of the reservoir and would help move sediment through the reservoir. Utilizing the SOMP processes would minimize impacts from sediment deposition in the reservoir to less than significant.

Figure 4.2-11: Sediment Load Passing San Clemente Dam through the Spillway and Fish Ladder for a Wet-year



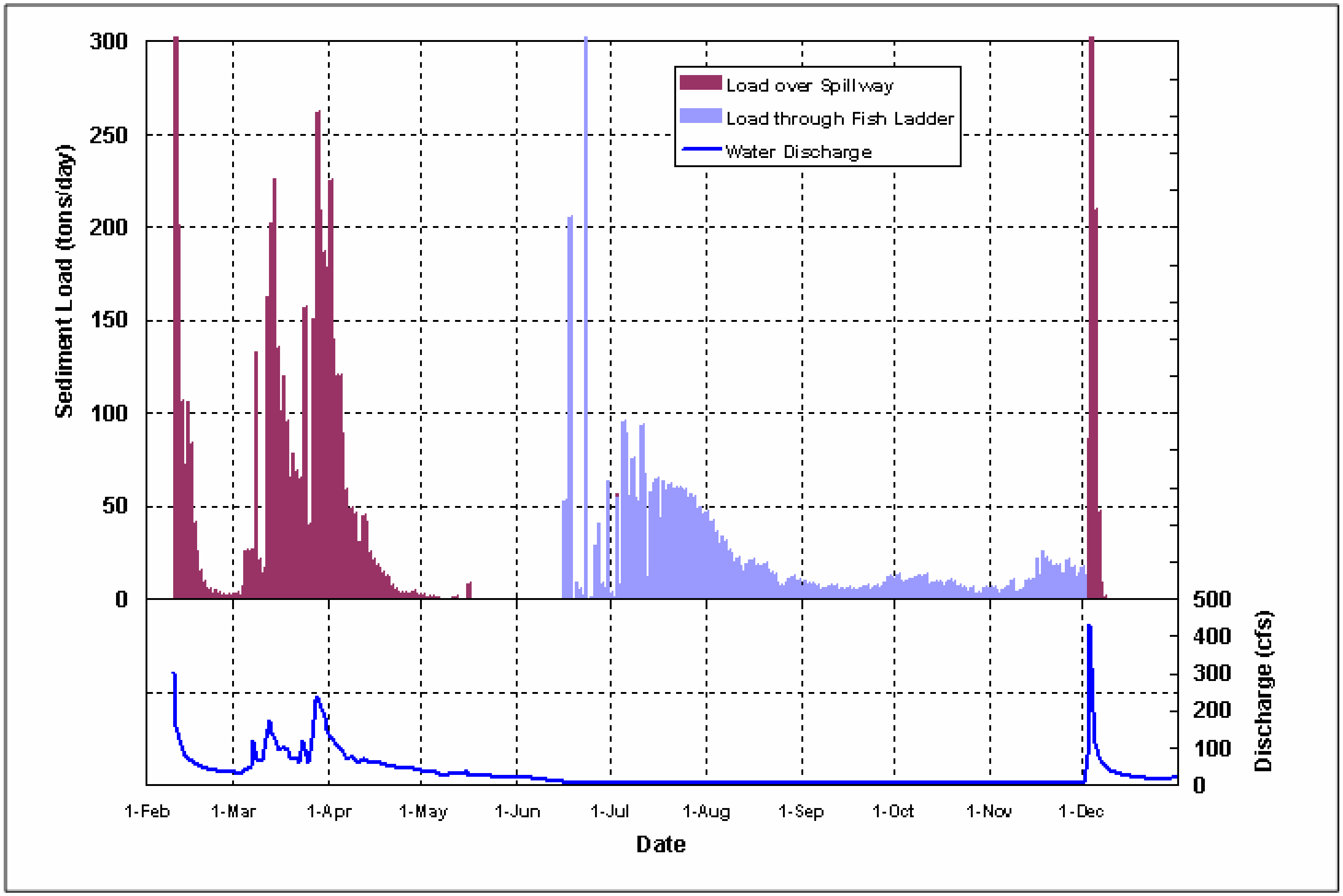
Source: MEI 2007b

Figure 4.2-12: Sediment Load Passing San Clemente Dam through the Spillway and Fish Ladder for a Dry-year



Source: MEI 2007b

Figure 4.2-13: Sediment Load Passing San Clemente Dam through the Spillway and Fish Ladder for a Dry-year when the Fish Ladder Capacity is 10 cfs



Source: MEI 2007b

Issue WR-3b: Increased Sediment Deposition that Obstructs Fish Passage

During low-flow years, when all the flow is through the fish ladder, sediment would move close to the fish ladder, and possibly impair fish passage from the ladder to the remnant pool
Determination: ***less than significant with mitigation, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction including sluicing activities previously described in impact issues WR-2, WR-3, and WR-4 of the Draft EIR/EIS.

During low-flow periods, when all of the river flow is going through the fish ladder, the slope of the water surface of the channel leading into the remnant pool is steep and has a high sediment transport capacity. This sediment can build up in a wedge in the remnant pool that would approach the fish ladder exit. Fine sediment would be conveyed toward and through the fish ladder. This is not strictly an effect of the project, as it occurs under existing conditions.

This impact would be reduced by decreasing the capacity of the ladder and forcing more water over the spillway. When water is flowing over the spillway, the water surface elevation of the remnant pool would be controlled by the spillway elevation rather than the fish ladder elevation. This would decrease sediment transport into the pool and cause any sand to deposit at the upstream end of the pool. Implementation of the SOMP (Appendix J) would remove sediment that would otherwise deposit upstream of the fish ladder.

MITIGATION

Implementation of the SOMP would improve the sediment conditions upstream of the reservoir and help move sediment through the reservoir, which would improve fish passage. Utilizing the SOMP processes would minimize impacts from sediment deposition in the reservoir to less than significant.

Issue WR-4a: Increased Sediment Deposition in the Lower River

The increased sediment load passing SCD depositing in the Carmel River bed below SCD
Determination: ***less than significant, no mitigation required, potentially beneficial, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues, WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including sluicing activities that were discussed in WR-2, WR-3, and WR-4 in the Draft EIR/EIS.

The historic transport of sediment load down the Carmel River was interrupted by the construction of SCD (this is not an impact of the project, but a baseline condition). However, implementation of this alternative passes additional sediment over the Dam to the lower river. Sediment transport simulations indicate that under the Proponent's Proposed Project about 506 AF would pass SCD for the 41-year simulation and of this amount, about 57 AF would be stored in the lower river. Although this sediment load would be less than the total sediment load upstream of the Dam, it would improve baseline conditions and would reestablish some of the sediment continuity in the river.

During the sluicing event, additional sediment would be released downstream. The total sediment load delivered to the lower river following a sluicing event is shown in Figure 4.2-14. The figure shows that sediment supply to the reservoir in a wet-year would be about 35 AF. About 28 AF passes SCD for the modified baseline (no sluicing) and about 32 AF passes SCD under the Proponent's Proposed Project with sluicing. About 4 AF of sediment would be delivered to the river by sluicing.

For a dry-year, about 2.4 AF of sediment is delivered to the reservoir from upstream, about 3.8 AF would pass the Dam for the modified baseline (no sluicing), and 8.8 AF of sediment would move downstream past the Dam under the Proponent's Proposed Project with sluicing and with the fish ladder operating at full capacity or at 10 cfs capacity (Figure 4.2-15).

The gradation of the sediment passing the Dam after a sluicing event as simulated in the model is shown in Figure 4.2-16. Under the Proponent's Proposed Project, most of the sediment passing the Dam would be very fine sand to very coarse sand. However, some sediment in sizes up to fine gravel also would pass the Dam (Figure 4.2-16). This load represents a larger sediment load than under the modified baseline (no sluicing) and represents a potential improvement to the lower river. In a wet-year, the sediment load passing SCD is simulated to be less than the supply, whereas in a dry-year, the load is greater than the supply.

MITIGATION

In the Draft EIR/EIS, the SOMP was included as a mitigation measure for this issue, which was characterized as short-term, significant, and unavoidable; long-term, less than significant with mitigation, and potentially beneficial. However, additional sediment transport modeling studies discussed previously in this section show that, although a small increase in sediment transport would occur with sluicing under the Proponent's Proposed Project, this impact would be less than significant and no mitigation would be required.

Figure 4.2-14: Simulated Cumulative Sediment Volume Passing San Clemente Dam for Wet-year Hydrology

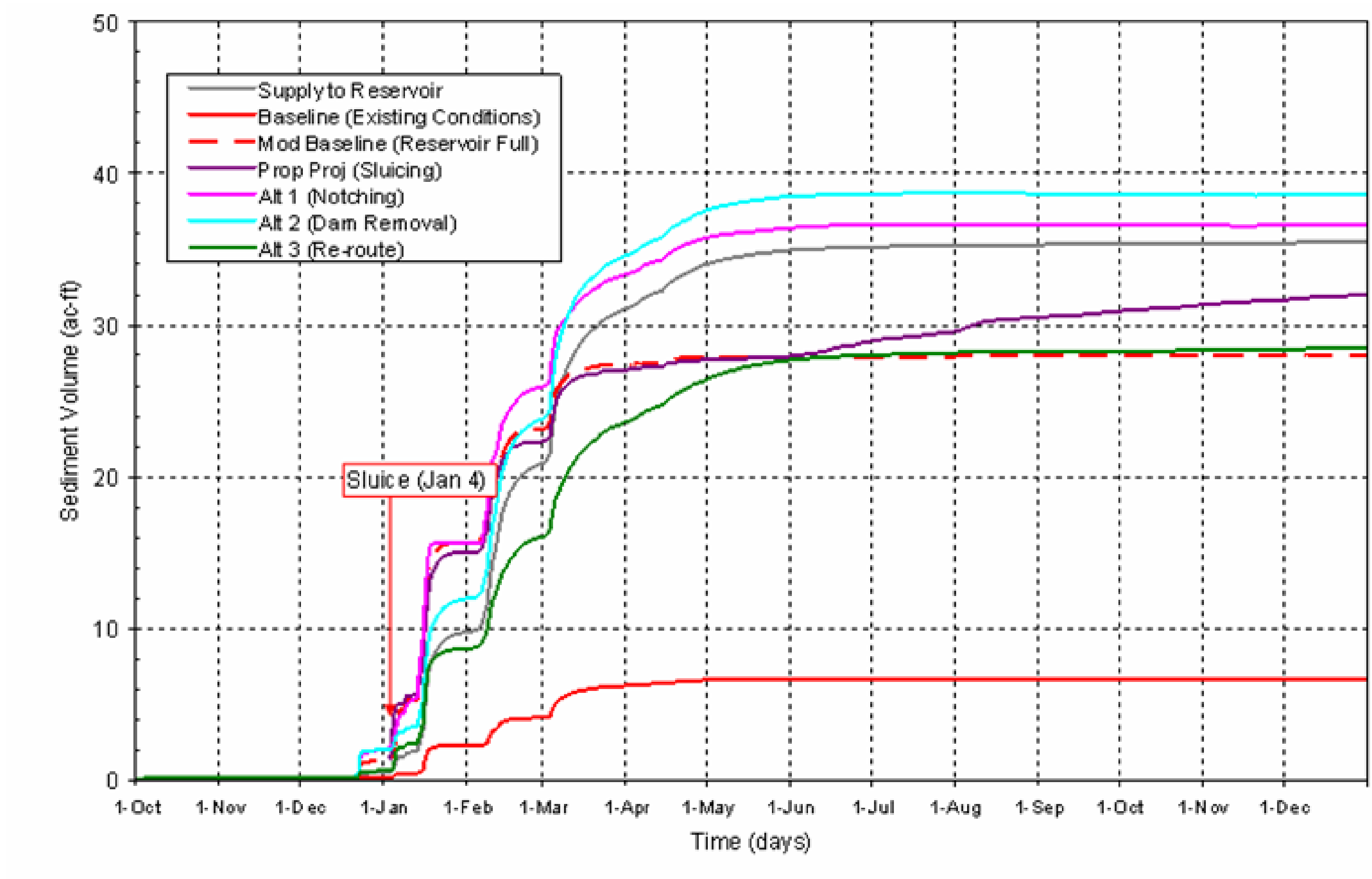


Figure 4.2-15: Simulated Cumulative Sediment Volume Passing San Clemente Dam for Dry-year Hydrology

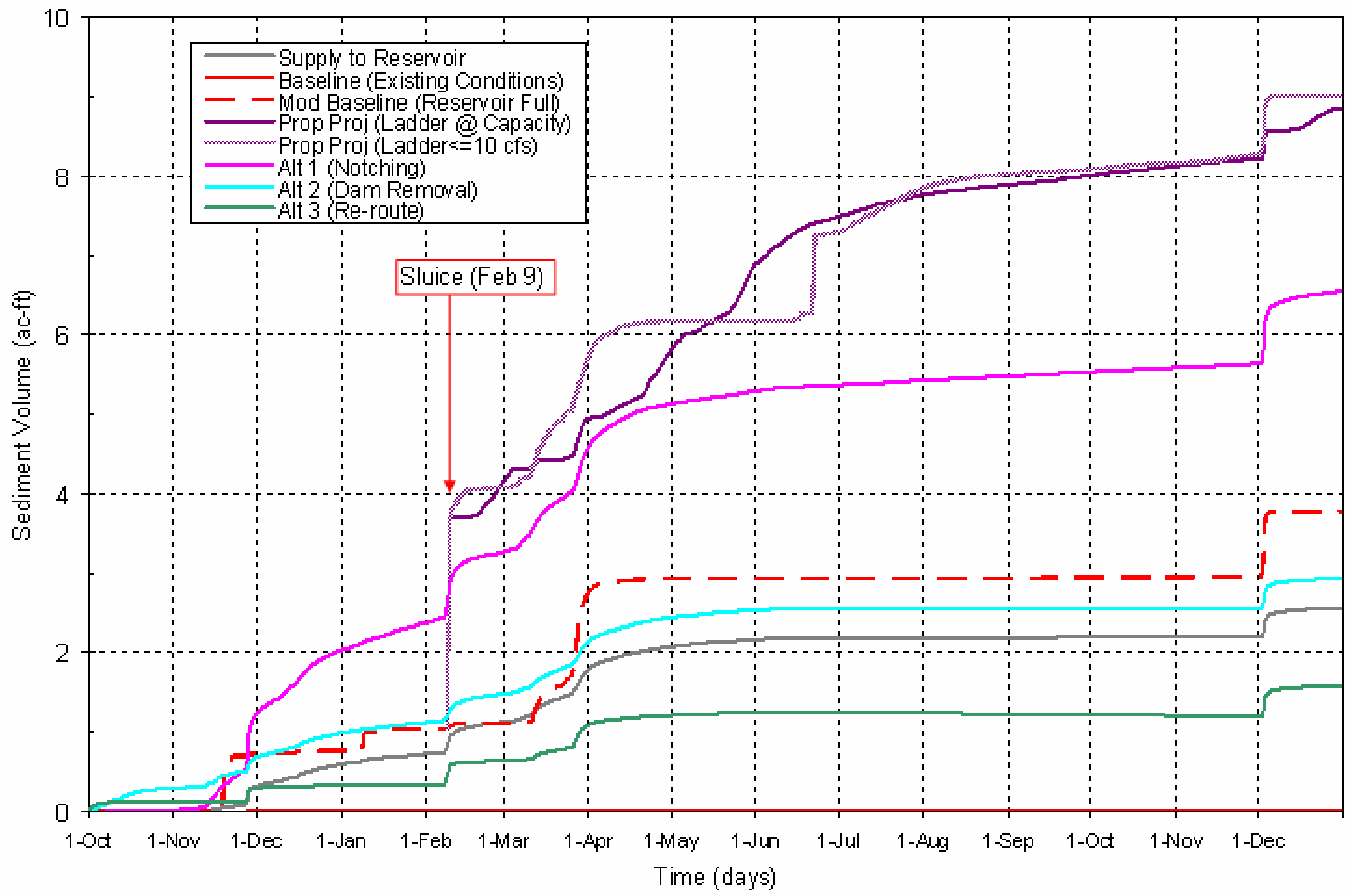
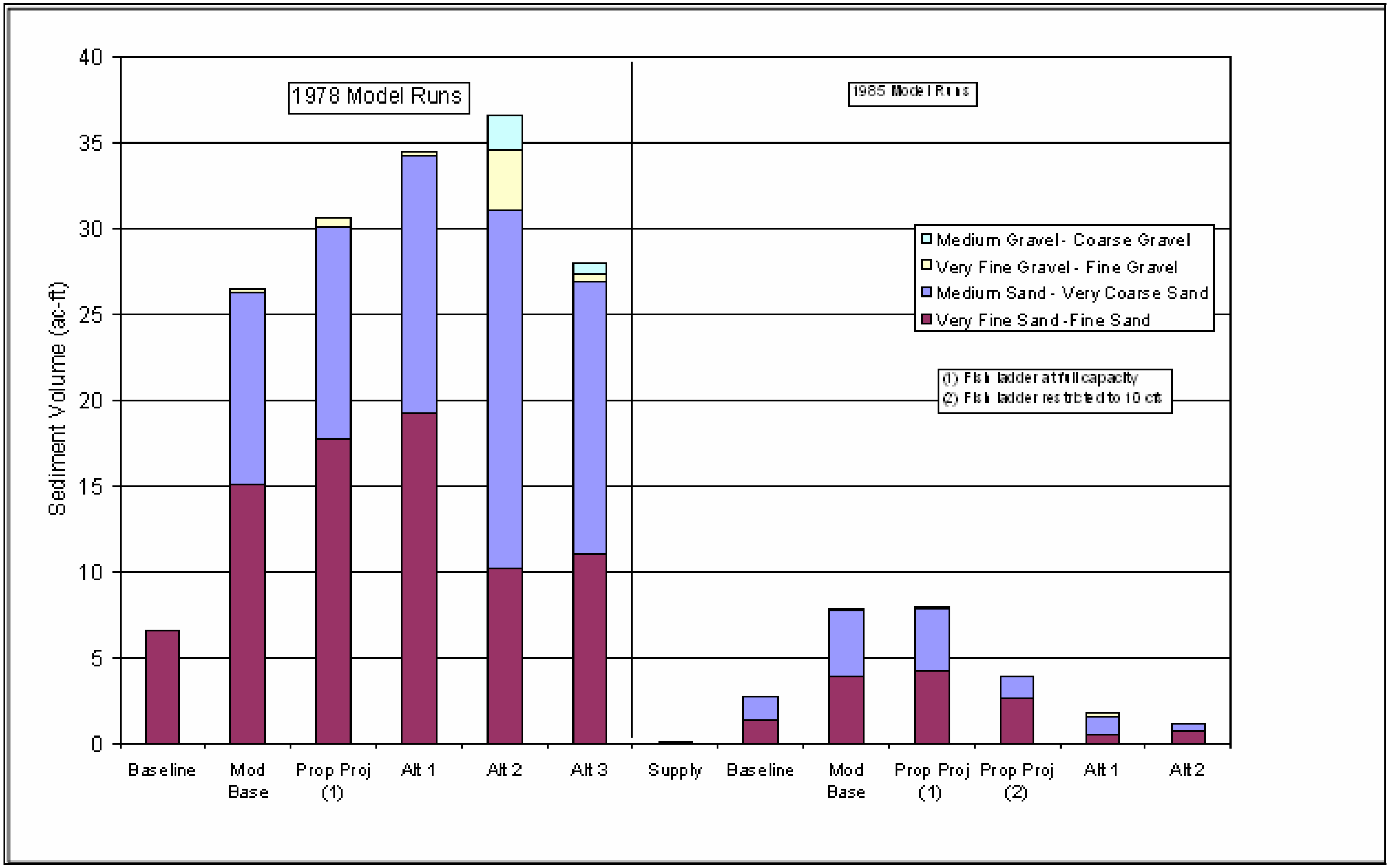


Figure 4.2-16: Simulated Sediment Gradation Passing SCD following a Sluicing Event



Source: MEI 2007b

Issue WR-4b: Increase in Frequency of High Suspended Sediment Concentrations

High flows will increase the sediment concentration in the river and sediment management activities, such as sluicing, would further increase the suspended sediment concentration downstream of the Dam
Determination: ***less than significant, no mitigation required, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues, WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including sluicing activities that were discussed in WR-2, WR-3, and WR-4 in the Draft EIR/EIS.

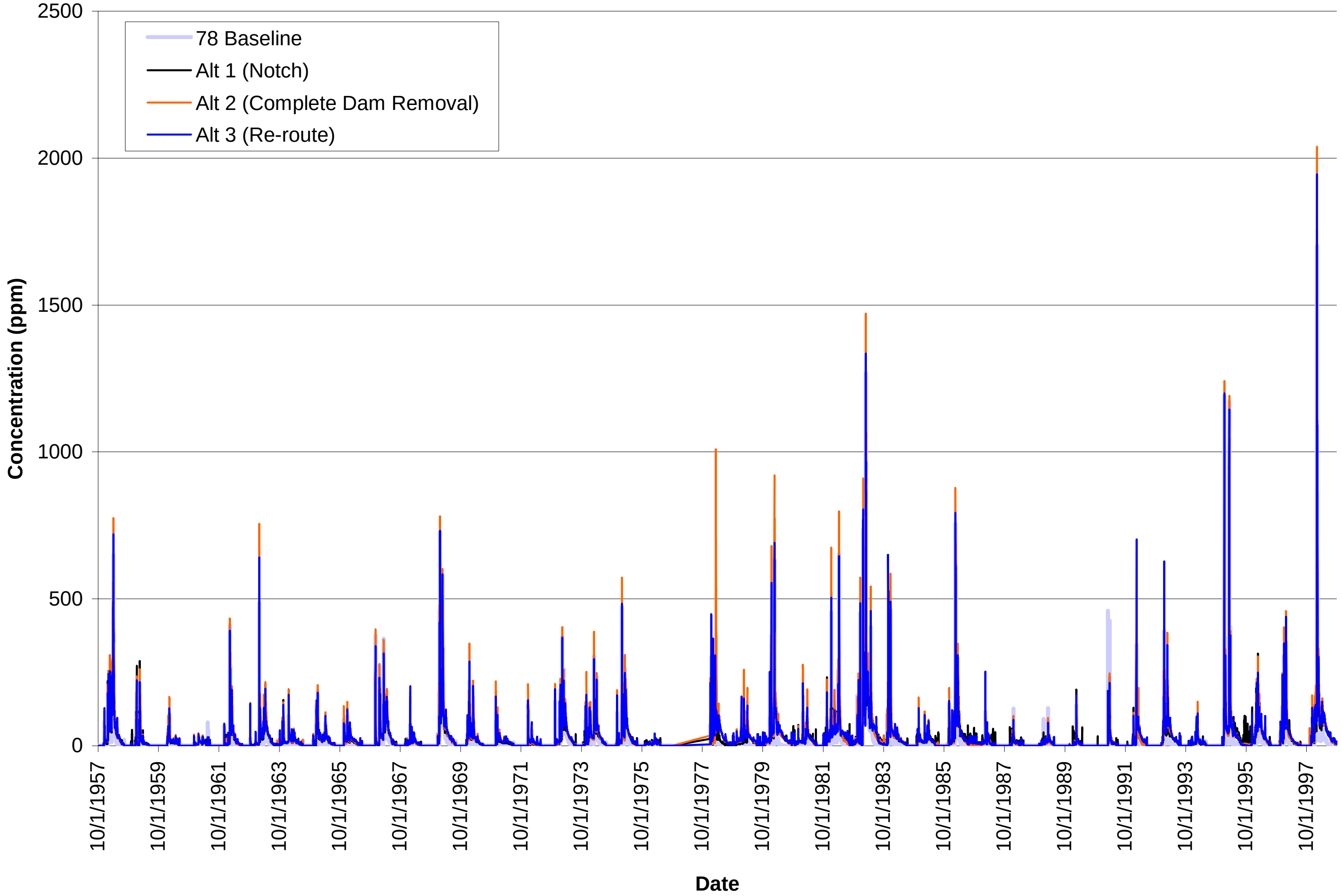
Suspended sediment concentration responds to the hydrology of the river. High flows increase the suspended sediment concentration. This increase is related to the flow and not the project alternatives. During high flows, the transport capacity increases and the size of the sediment that is moved by the flow increases. Sediment management activities, such as sluicing would cause a short-term increase in suspended sediment concentration in the lower river.

Simulations of the sluicing event for both a wet and dry-year indicate that the suspended sediment concentration increases with the sluice, but that the increase is short-lived in both time and distance downstream of the Dam (Appendix O).

The downstream suspended sediment concentration was simulated for the alternatives under the 41-year hydrologic record using the sediment loading from the modeling. The long-term sediment concentration at reaches 4.3, 6.0, and 9.0 is shown in Figure 4.2-17, Figure 4.2-18 and Figure 4.2-19. These three reaches represent the Carmel River upstream near SCD, midway along the river, and downstream near the mouth. The simulation of the Proponent's Proposed Project is similar to the baseline condition without sediment management.

The daily suspended sediment concentration results were evaluated for the 41-year simulation based on ranges of concentration for each river reach (Table 4.2-5). The table presents the number of days that the suspended sediment concentration exceeds 500 parts per million (ppm). This concentration is used in this analysis as a threshold for potential adverse impacts to fish.

Figure 4.2-17: Simulated Suspended Sediment Concentration at Reach 4.3 for the 41-Year Simulation, Wet-Year Hydrology



Source: MEI 2007b

Figure 4.2-18: Simulated Suspended Sediment Concentration at Reach 6.0 for the 41-year Simulation, Wet-Year Hydrology

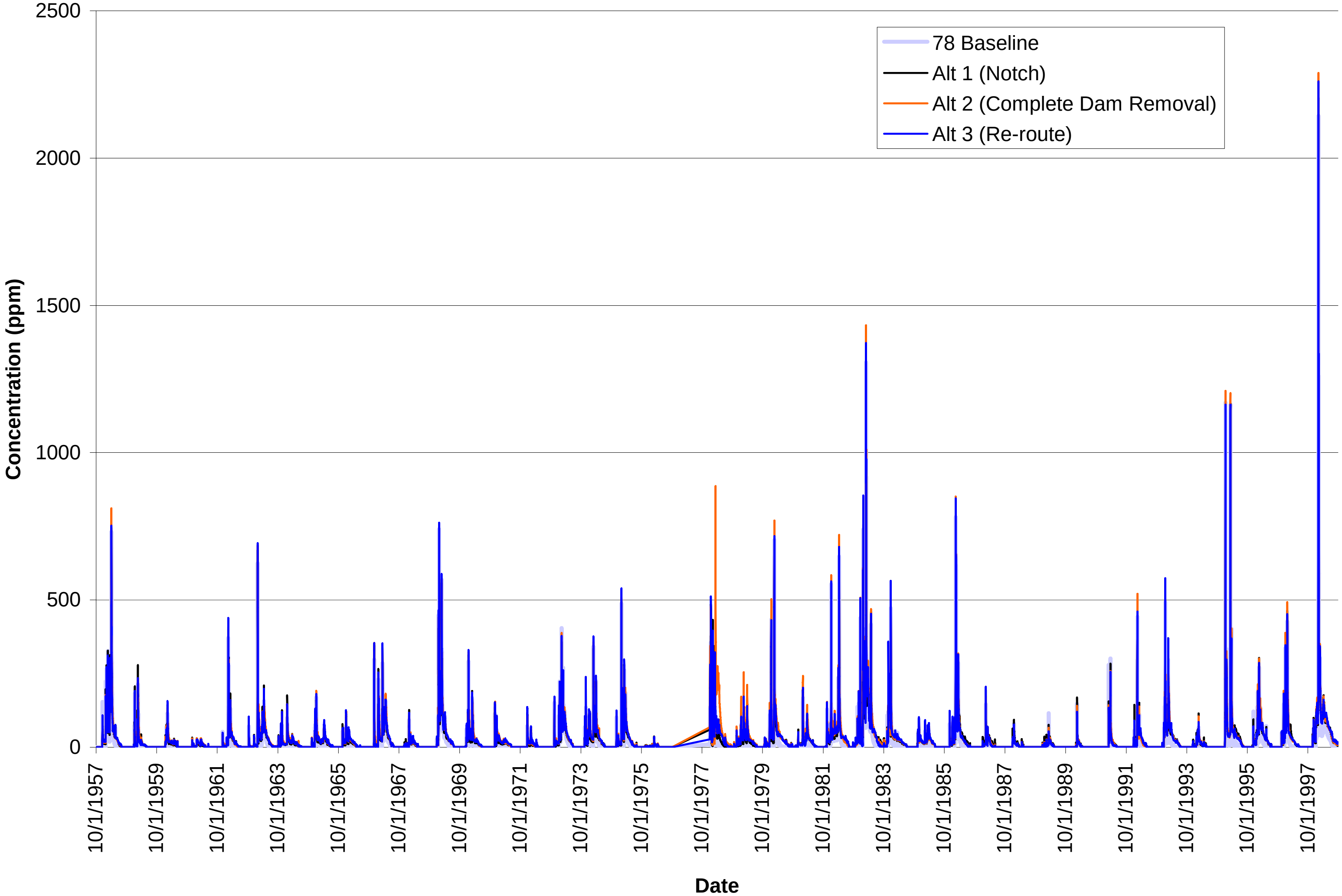


Figure 4.2-19: Simulated Suspended Sediment Concentration at Reach 9.0 for the 41-year Simulation, Wet-Year Hydrology

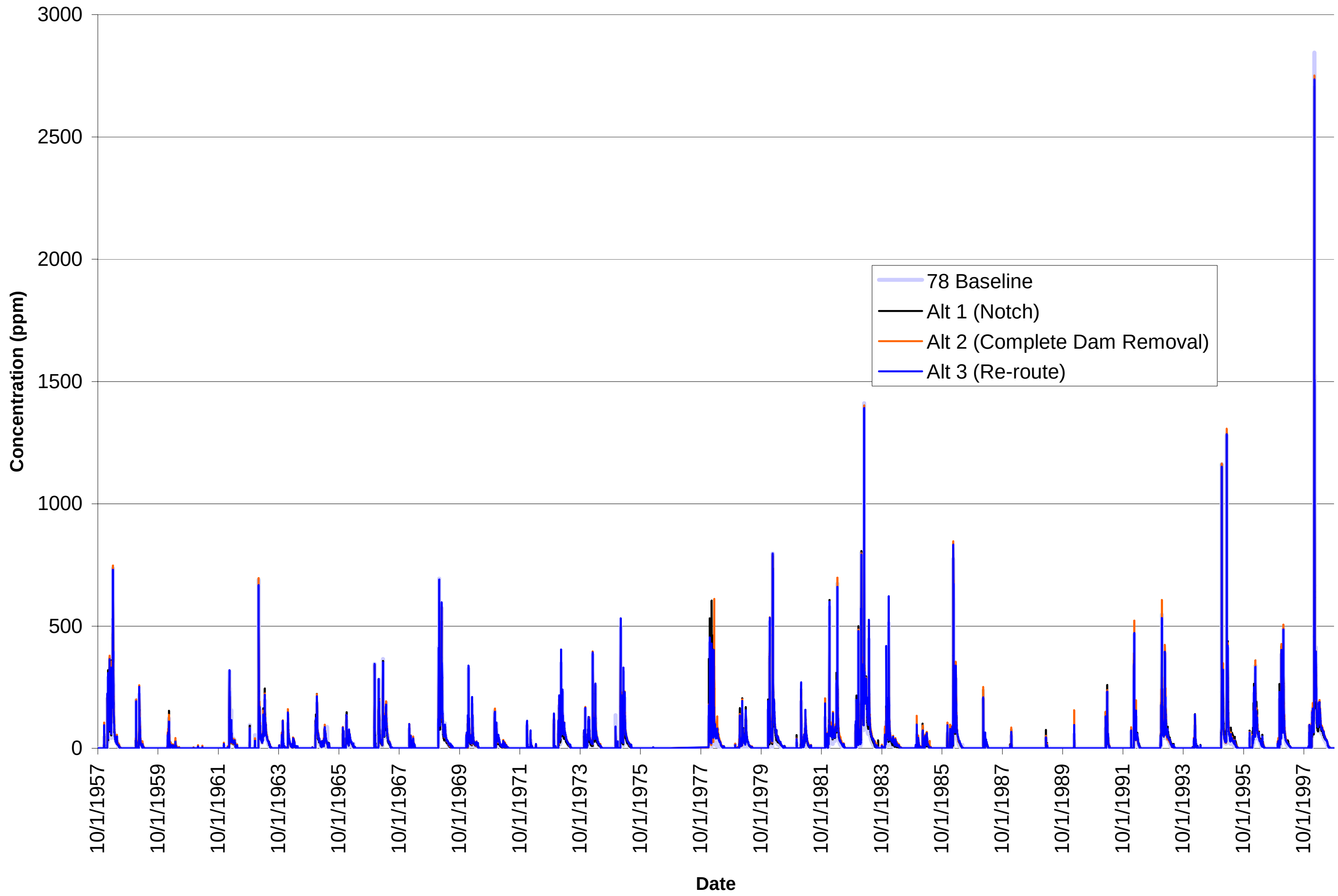


Table 4.2-5: Number of Days with Simulated Suspended Sediment Concentration within Defined Limits for the Proponent's Proposed Project

Wet-Year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	**R4.7**	**R5**	**R6.3**	**R6.7**	**R7.3**	**R7.7**	**R8.3**	**R8.7**	**R9**
Less than 200	14,643	14,640	14,618	14,619	14,620	14,601	14,594	14,613	14,570	14,569
200-400	108	116	133	124	118	136	141	126	166	170
400-500	19	15	17	21	24	23	24	23	23	22
500-600	5	5	6	8	8	8	9	9	11	9
600-800	9	9	10	11	13	15	11	12	11	11
800-1000	4	3	2	3	2	2	6	2	3	4
1000-1200	2	2	3	3	1	1	1	2	4	3
1200-1400	1	1	2	2	3	4	4	3	1	1
1400-1600	0	0	0	0	2	1	1	1	2	2
1600-1800	1	1	0	0	0	0	0	0	0	0
1800-2000	0	0	0	0	0	0	0	0	0	0
>2000	0	0	1	1	1	1	1	1	1	1
Greater than 500	22	21	24	28	30	32	33	30	33	31
Dry-Year Hydrology										
Concentration (mg/L)	**Reach**									
	R4.3	**R4.7**	**R5**	**R6.3**	**R6.7**	**R7.3**	**R7.7**	**R8.3**	**R8.7**	**R9**
Less than 200	14,628	14,626	14,607	14,611	14,600	14,581	14,571	14,585	14,562	14,556
200-400	119	121	136	131	134	149	156	153	175	183
400-500	18	22	21	20	20	20	25	19	19	20
500-600	10	7	10	12	15	15	13	12	11	9
600-800	9	8	8	8	11	15	15	12	14	13
800-1000	4	3	4	3	4	4	4	3	3	3
1000-1200	2	1	1	4	2	2	2	3	4	4
1200-1400	1	3	4	1	3	3	3	2	1	1
1400-1600	0	0	0	1	2	2	2	2	2	2
1600-1800	1	1	0	0	0	0	0	0	0	0
1800-2000	0	0	0	0	0	0	0	0	0	0
>2000	0	0	1	1	1	1	1	1	1	1
Greater than 500	27	23	28	30	38	42	40	35	36	33

Note: Reach 4.3 is immediately below SCD. Reach 9 is at the lagoon. Simulation period is 41 years.

The majority of the simulated values are less than 200 ppm for the 41-year record. However, the simulated suspended sediment concentration does exceed 500 milligrams per liter (mg/L) from 21 to 33 days for the wet-year hydrology. In the dry-year hydrology, 500 mg/L is exceeded from 23 to 42 days in the lower river.

The influence of a sluice event on suspended sediment concentration in the river from SCD to the ocean was evaluated from the single-year modeling results. Sediment loading results from the one-year sluicing simulation were used to compute the suspended sediment load in the lower river.

Figures O-1 through O-10 in Appendix O show a suspended sediment concentration hydrograph for ten river reaches distributed from the Dam (station 4.3) to the lagoon (station 9) in a wet-year. These figures show that the sediment released during a sluicing event dissipates rapidly in the downstream direction so that the effects of the sluice are not observed far downstream. Similarly, describing a wet-year sluice event in terms of the daily suspended sediment for the longitudinal distance downstream of the Dam also shows a pattern of dissipation (Appendix O, Figures O-11 through O-14). These figures show suspended sediment concentration in the river, downstream of SCD, for the day of the sluice and during the three following days. The highest simulated suspended sediment concentration would be found in reach 4.3 (subdivided into a, b, and c). The sediment concentration drops to background levels by reach 4.7.

Appendixes O, Figures O-15 through O-24 show the sediment concentration in the lower river after a dry-year sluice event. Appendix O Figures O-25 through O-28 show the concentration for a dry-year sluice along the lower Carmel River from day 1 to day 4 of the event. Generally, similar levels of sediment occur in the river as compared to the modified baseline downstream from Reach 5 (Hitchcock Canyon to Robles del Rio).

Appendix P plots exceedance against concentration for each river station for the one-year sluice simulation. The plots track exceedance up to the 50 percent exceedance level, (that is, up to the point at which 50 percent of the concentrations are greater than the threshold level, which is 500 ppm). The figures in Appendix P show that the suspended sediment concentration from sluicing would not persist either at one location over several days or in the downstream direction. In Reach 4.3, the Proponent's Proposed Project results in the highest suspended sediment concentration as compared to other project alternatives, when concentrations are about 300 ppm or less.

The exceedance plots show that for a wet year, sluicing increases sediment concentrations in Reach 4.3, but concentrations would decrease downstream. All of the alternatives arrive at roughly similar concentrations by Reach 7.3. For the dry-year, sluicing results in higher concentrations compared with the baseline from Reach 4.3 downstream to reach 6.7. From Reach 6.7 to the ocean, sluicing results in the same concentrations as the modified baseline.

Sluicing of sediment from upstream of the Dam would be conducted only if wet season sediment management is needed (see SOMP, Appendix J) and during periods of high flow in the river. If sluicing were needed, the concentration in the river downstream would be monitored as part of an adaptive management approach (see the SOMP, Appendix J). The results of the monitoring would be used to determine the duration and magnitude of sluicing events.

MITIGATION

In the Draft EIR/EIS, Impact issue WR-4b was short-term, significant, and unavoidable; long-term, less than significant with mitigation and potentially beneficial. The SOMP was also included as a mitigation measure for this impact. The additional suspended sediment concentration studies discussed above show that if sluicing is implemented during high-flow periods within the wet season, the impacts for this issue under the Proponent's Proposed Project would be less than significant and no additional mitigation would be required.

Issue WR-5: Changes in Channel Bed Geometry

Additional sediment passing the Dam to the lower river would aggrade or degrade the river channel or change the channel cross sections
*Determination: **less than significant, potentially beneficial no mitigation required, long-term***

IMPACT

The channel of the lower river has adjusted over time to the depleted sediment supply. Although this alternative would add additional sediment beyond the baseline levels, the increased load would not significantly add to the channel downstream. In addition, the increase in the sediment loading downstream would occur slowly, as seen in the sediment transport modeling results presented above. Although not intended to improve sediment supply, implementation of the SOMP would incidentally improve the sediment supply for the lower river by reducing the trap efficiency of the reservoir. This would also help the river slowly reestablish the sediment continuity. This impact would be less than significant.

MITIGATION

In the Draft EIR/EIS, Impact Issue WR-5 was less than significant with mitigation. As a result of additional sediment modeling, the impact under the Proponent's Proposed Project would be less than significant and no mitigation would be required.

Issue WR-6: Changes to the 100-year Flood Elevation

The increased sediment loading would alter the bed of the Carmel River and influence the 100-year flood elevation
*Determination: less **than significant, no mitigation required, long-term***

IMPACT

Changes in the downstream sediment loading would influence the bed elevation, which in turn, would alter flood elevations. It is not anticipated that this would significantly alter the 100-year flood elevation. As explained above, implementation of the SOMP under the Proponent's Proposed Project would incidentally gradually reduce the trap efficiency and add sediment to the river. This would also allow the river to slowly adjust to the increasing sediment supply.

MITIGATION

In the Draft EIR/EIS, Impact Issue WR-6 was less than significant with mitigation. As a result of additional sediment modeling, the impacts under the Proponent's Proposed Project would be less than significant and no mitigation would be required.

Issue WR-7: Impact to the Location or Timing of Water Supply Diversions

Changes to the location or timing of water supply diversions

Impacts and mitigation measures for Issue WR-7 would not occur under the Proponent's Proposed Project. SCD provides an existing point of diversion for CAW on the Carmel River, which would be maintained and unaltered.

Issue WR-8: Increased Risk of Dam Failure

Risk of dam failure due to seismic activity or flooding, leading to or increasing downstream flooding
Determination: ***less than significant, no mitigation required, long-term***

IMPACT

Please refer to Section 4.1 Geology and Impact Issue GS-1 for a discussion of seismic risks. Under the Proponent's Proposed Project, dam thickening would eliminate the potential for dam failure during the MCE and PMF.

MITIGATION

In the Draft EIR/EIS, discussion for this impact incorrectly identified the Proponent's Proposed Project as mitigation for this impact. However, no mitigation would be required for this impact, as the San Clemente Dam Seismic Safety Project specifications are designed to withstand a MCE, as well as peak ground accelerations, a condition that cannot be met by the existing dam. The project would satisfy the EIR/EIS purpose and need of eliminating the potential for dam failure that may occur during a MCE and/or PMF.

Alternative 1 (Dam Notching)

WR-1: Changes in Streamflow during Construction

Changes in streamflow downstream of the Dam during construction drawdown, dewatering the plunge pool, or when inflow exceeds the bypass capacity
Determination: ***less than significant, no mitigation required, short-term***

IMPACT

The impact potential would be the same as discussed for the Proponent's Proposed Project, Impact Issue WR-1. Due to limited storage capacity, releases from the Dam would not significantly increase river flows. Additional releases to the downstream reaches of the Carmel River would occur only during drawdown and would be less than significant during CY 4, 5, and 6.

During the winter and spring, runoff from upstream would temporarily fill the excavated reservoir with water. The drawdown during CY 4, 5, and 6 would be approximately 500 AF. To drawdown the reservoir over the same 20-day period as described in the Proponent's Proposed Project, Impact Issue WR-1, the increase in discharge would be approximately 13 cfs. This increase is within the range of variability observed during this time period at the Robles del Rio stream gage under baseline conditions, therefore this impact would be less than significant.

MITIGATION

No mitigation required (see discussion for the Proponent's Proposed Project under Impact Issue WR-1).

WR-2a: Changes in Sediment Flow Passing SCD Immediately after Construction

Changes in the amount of sediment transported from the upper watershed (above SCD) to the lower Carmel River (below SCD) immediately after construction
Determination: ***less than significant, no mitigation required, short-term***

IMPACT

In the Draft EIR/EIS, Impact Issue WR-2 covered both construction and operational impacts. In this Final EIS/EIS, discussion of Impact Issues WR-2a and WR-2b are limited to construction. Operational impacts are discussed in Issues WR-3a, WR-3b, WR-4a, and WR-4b.

Similar to the Proponent's Proposed Project, Alternative 1 would involve excavation of sediment from upstream of SCD to allow access to the Dam for construction activities. The amount of excavation would be greater for this alternative because of the excavation needed for the notching. This would increase the available storage area upstream of the Dam and would trap additional sediment in the years immediately after construction. This would influence the sediment load passing SCD to the lower river by increasing the trap efficiency resulting in less sediment transport downstream.

No mitigation would be required (see discussion for the Proponent's Proposed Project under Impact Issue WR-2a).

WR-2b: Changes in Sediment Storage and Composition in the Lower River during Construction

Changes in the sediment composition of the Carmel River below SCD
Determination: ***less than significant with mitigation, short-term***

IMPACT

This impact is similar to Impact Issue WR-2b described above for the Proponent's Proposed Project.

MITIGATION

No mitigation required (see discussion for the Proponent's Proposed Project under Impact Issue WR-2b).

WR-3a: Change in Sediment Deposition in the Reservoir

Changes in the amount of sediment deposited in the reservoir upstream of SCD
Determination: ***less than significant with mitigation and potentially beneficial, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including sluicing activities that were discussed in WR-2, WR-3, and WR-4 in the Draft EIR/EIS.

The trap efficiency of the reservoir would decrease over time from the current level of 75 percent to about 10 percent. The efficiency would decrease further with sediment management activities detailed in the SOMP (Appendix J). As the trap efficiency declines, additional sediment would be available downstream relative to the amount that was present under baseline conditions.

Under this alternative, the reservoir would be drawn down an additional 15 feet to elevation 495 to accommodate construction and dam notching would lower the spillway elevation to 506. An estimated 930 AF of sediment would be removed from behind the Dam to allow the reservoir to be drawn down to the level required for notching. This would lower the sediment elevation by about 19 feet and expose the upstream portion of the natural channel of both Carmel River and San Clemente Creek. The procedure for reservoir drawdown would be the same as described for the Proponent's Proposed Project except it would occur over three construction seasons.

Following dam notching and sediment excavation, a geomorphically stable channel would be constructed in the natural channel exposed by excavation and through the remaining stored sediment in the reservoir in both Carmel River and San Clemente Creek upstream to the point at which it intersects both channels. MEI developed reconstructed channels for use in modeling simulations (MEI 2007b) (Figure 4.2-20 and Figure 4.2-21).

Notching the Dam at elevation 506 would remove all currently remaining water storage capacity in the reservoir. The long-term trapping efficiency would decline to 9 percent and 11 percent for the dry-year and wet-year hydrology, respectively.

The sediment transport simulations suggest that about 89 AF and 100 AF of sediment would be stored in the reservoir under this alternative for the wet-year and dry-year hydrology, respectively (Figure 4.2-22 and Figure 4.2-23).

The SOMP would also be implemented under this alternative and sluicing would be used in the same way described for the Proponent's Proposed Project. A separate simulation was not performed because the results would be very similar to the sluicing simulation performed for the Proponent's Proposed Project due to the equitable volumes of sediment sluiced for both alternatives. Therefore, the results of that simulation apply to this alternative.

Figure 4.2-20: Typical Cross Section for Alternative 1 (Dam Notching) in the Carmel River Arm

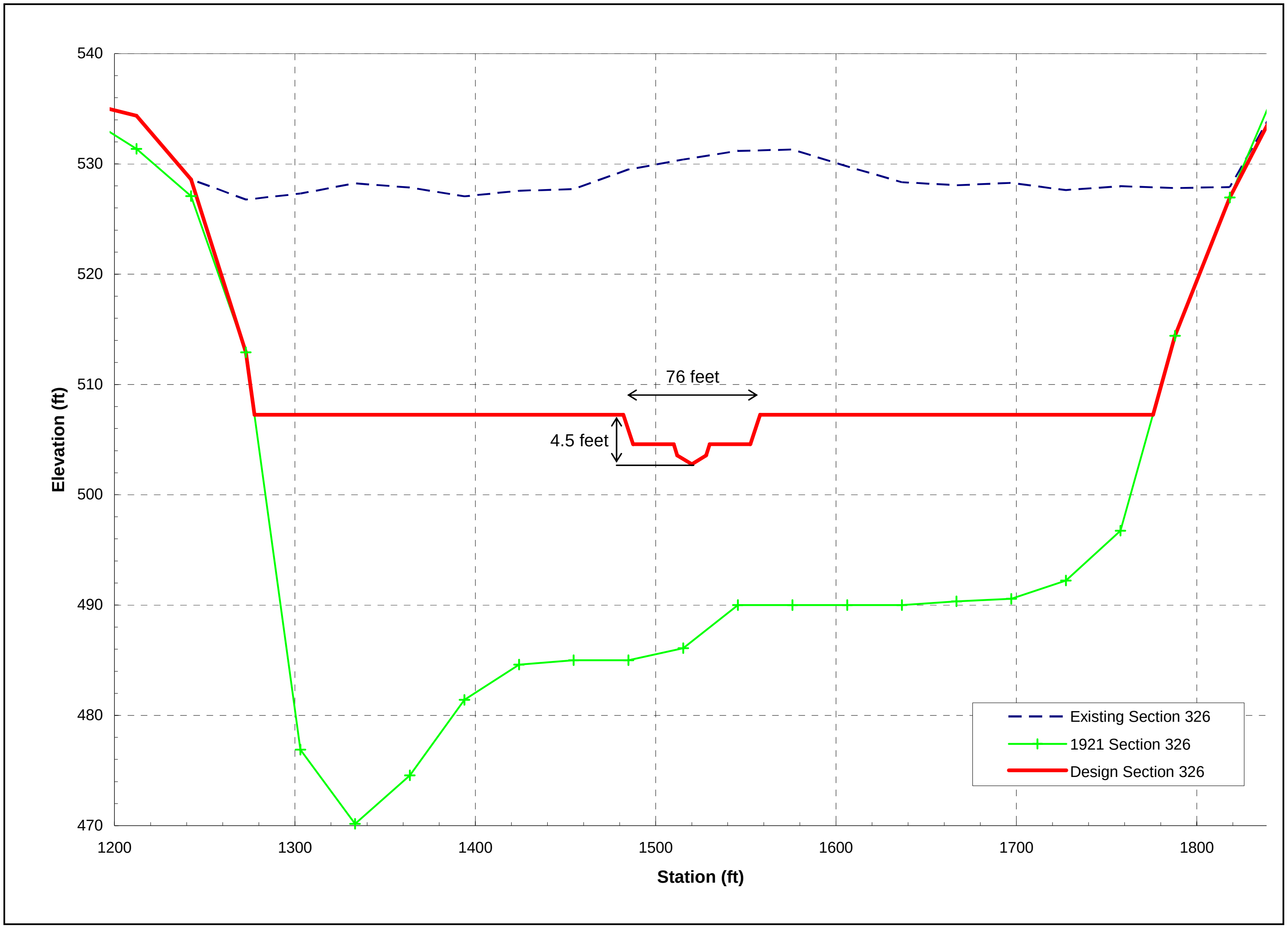


Figure 4.2-21: Typical Cross Section for Alternative 1 (Dam Notching) in the San Clemente Creek Arm

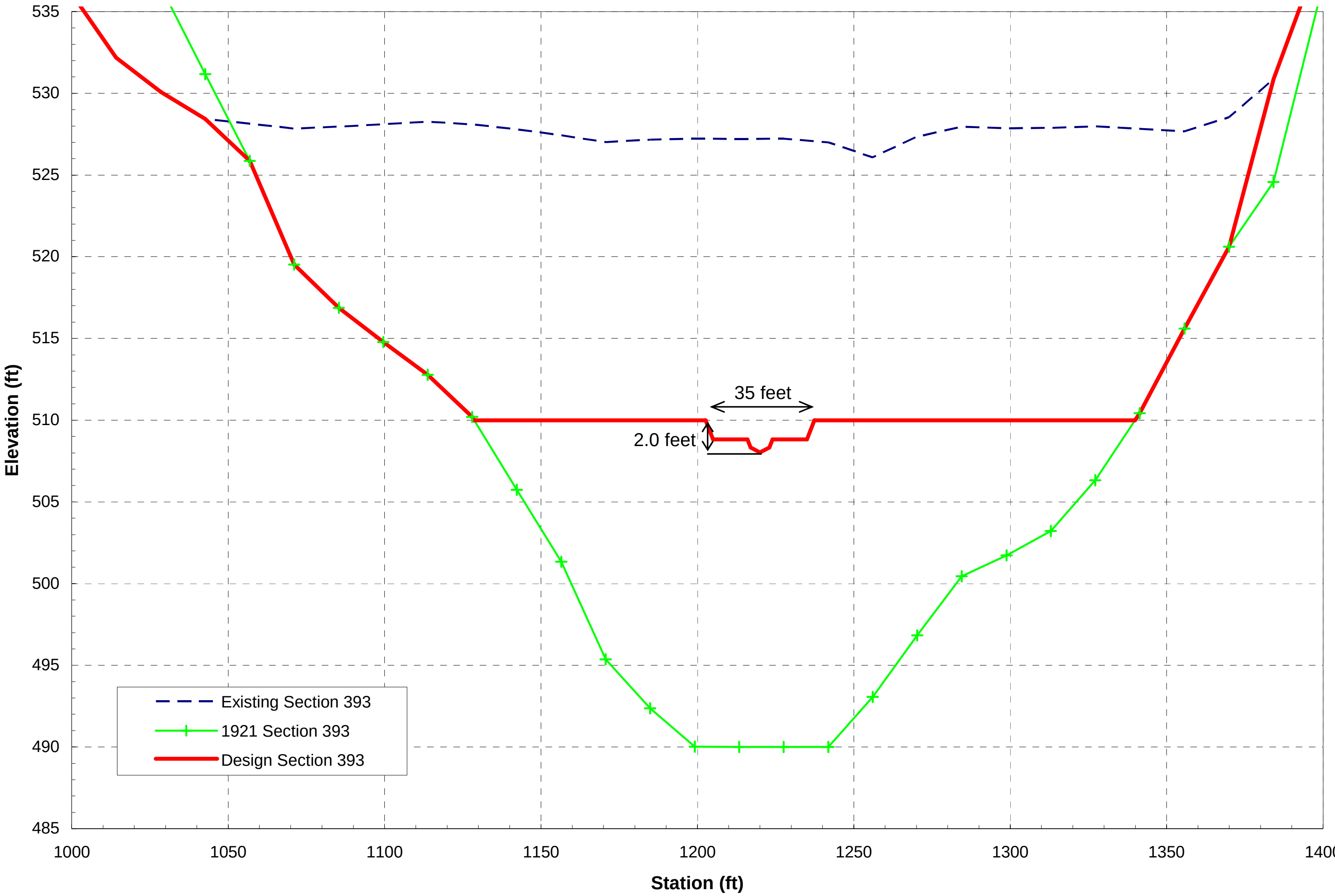
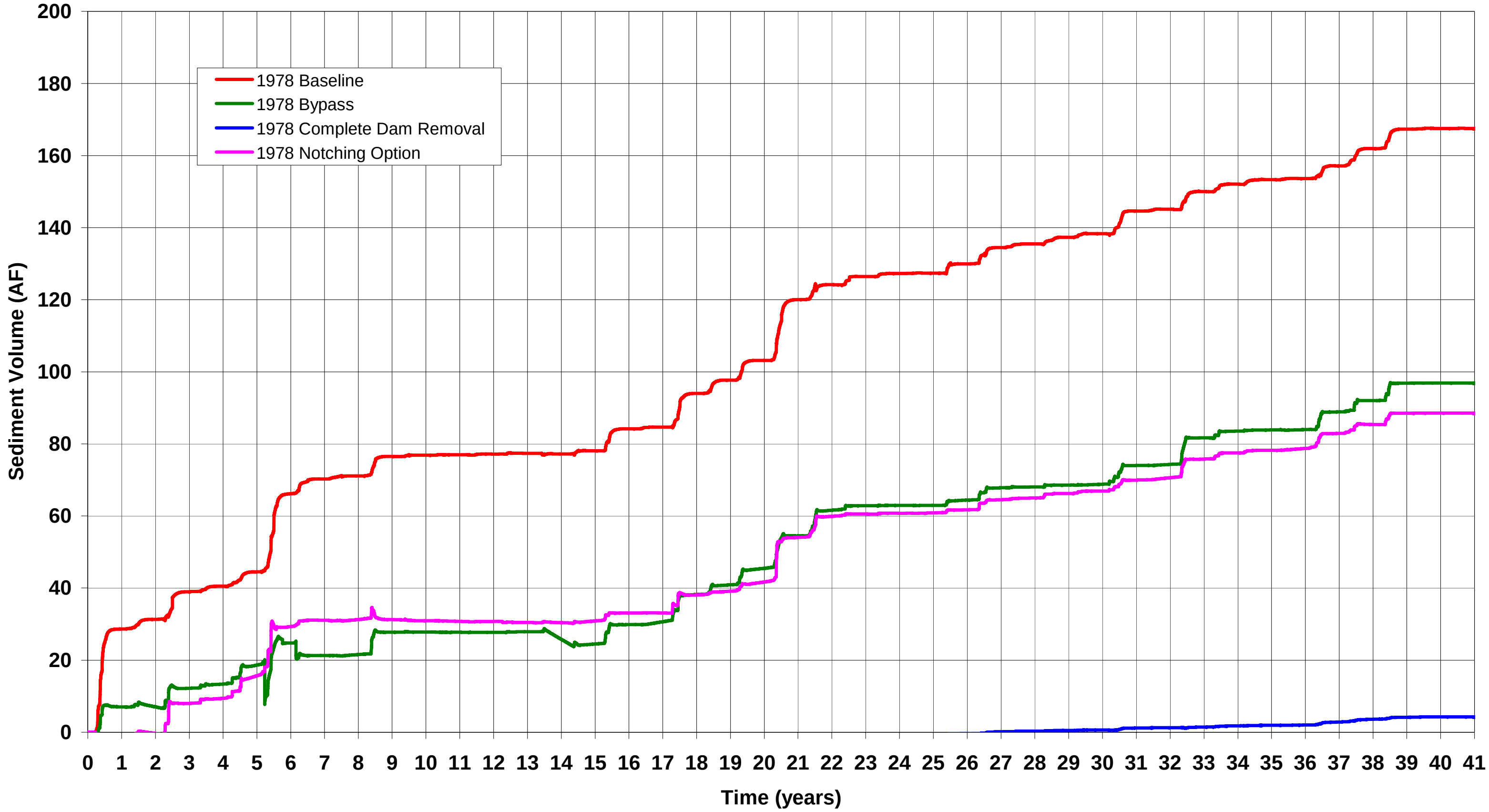
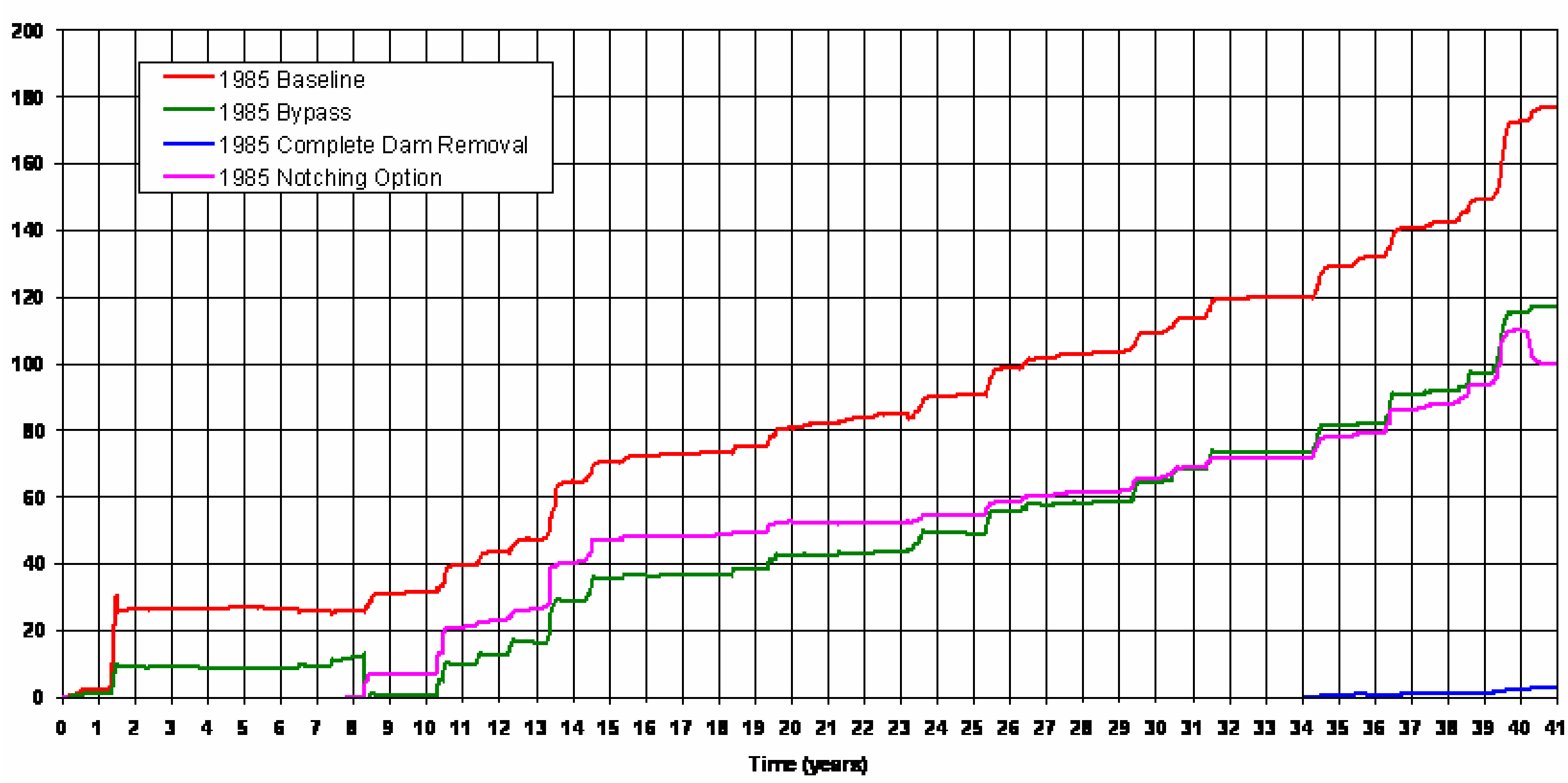


Figure 4.2-22: Total Sediment Volume Stored in San Clemente Dam during the 41-year Simulation, Wet-year Hydrology



Source: MEI 2007b

Figure 4.2-23: Total Sediment Volume Stored in San Clemente Dam during the 41-year Simulation, Dry-year Hydrology



Source: MEI 2007b

MITIGATION

Under Alternative 1, Impact Issue WR-3a would be less than significant with mitigation. See discussion for the Proponent's Proposed Project under Impact Issue WR-3a for mitigation measure of this impact.

WR-3b: Increased Sediment Deposition that Obstructs Fish Passage

During low-flow years, when all the flow is through the fish ladder, sediment would move close to the fish ladder, and possibly impair fish passage from the ladder to the remnant pool
Determination: ***less than significant with mitigation, long-term***

IMPACT

This impact is similar to Impact WR-3b described above for the Proponent's Proposed Project.

MITIGATION

See discussion for the Proponent's Proposed Project under Impact Issue WR-3b for mitigation.

WR-4a: Increased Sediment Deposition in the Lower River

The increased sediment load passing SCD depositing in the Carmel River bed below SCD
Determination: ***less than significant no mitigation required, long-term***

IMPACT

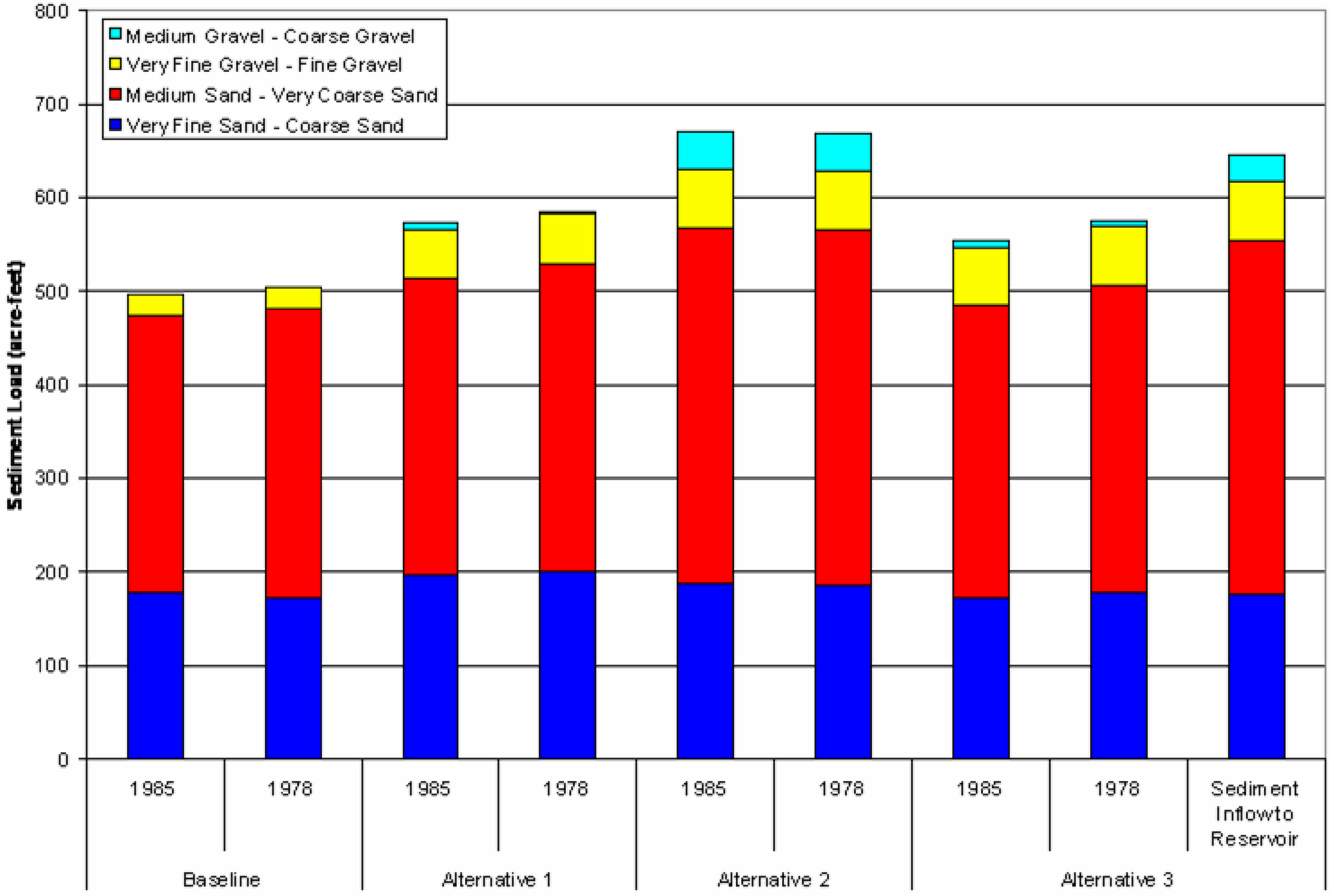
In this Final EIR/EIS, Impact Issues, WR-3a, WR-4b, WR-4a and WR-4b cover sediment management operations after construction, including sluicing activities that were discussed in WR-2, WR-3, and WR-4 in the Draft EIR/EIS.

The historic transport of sediment load down the Carmel River was interrupted by the construction of SCD (this is not an impact of the project, but a baseline condition). However, implementation of this alternative would result in additional sediment passing the Dam and depositing in the lower river. The load passing the Dam would also include sediment in the medium gravel-coarse gravel size fraction, which previously had been retained in the reservoir.

Although this sediment load is less than the total sediment load entering upstream of the Dam, it would be an improvement over baseline conditions and would reestablish some of the sediment continuity in the river.

The simulated sediment load delivered to the lower river under Alternative 1 is shown in Figure 4.2-24. About 585 AF would pass the Dam for the wet-year and 573 AF for the dry-year hydrology. This sediment volume passing SCD to the lower river would be greater than what would be delivered under the baseline conditions.

Figure 4.2-24: Simulated Total Sediment Volume and Size Fraction Passing San Clemente Dam for the 41-year Simulation



Of the sediment that passes SCD, about 58 AF and 60 AF would be stored in the lower river for the wet-year and dry-year hydrology, respectively (Figure 4.2-24 and Figure 4.2-25).

During sluicing events, additional sediment would be released downstream. The total sediment load delivered to the lower river following a sluicing event is similar to the Proponent's Proposed Project.

SCD has been trapping sediment and reducing the supply to the lower river for 86 years. Over time, the river has adjusted to the reduced sediment load by incising or widening the channel. The change in sediment loading to the lower river under Alternative 1 would change sediment supply to the lower river and could alter the channel. Possible changes include raising the channel bed elevation, which could influence flooding. Flooding and changes in channel bed geometry are discussed in Impact Issues WR-5 and WR-6. Simulation of the channel bed elevation as compared to the baseline elevation indicated that Alternative 1 would cause only localized changes in the channel bed elevation; elevation increases would exceed one foot at several locations in the lower river (Figure 4.2-27 and Figure 4.2-28).

Under the wet-year hydrology, the increases in bed elevation would occur in Reaches 8.7 and 4.7, and 4.3. At these locations, the bed elevation would increase over the baseline condition by 1.5 feet, 1.1 feet, and 3.1 feet, respectively. The 3.1-foot change would occur between SCD and the OCRD. These results are discussed further in Impact Issue WR-6 below.

MITIGATION

No mitigation would be required (see discussion for the Proponent's Proposed Project under Impact Issue WR-4a).

WR-4b: Increase in Frequency of High Suspended Sediment Concentrations

High flows will increase sediment concentration in the river and sediment management activities, such as sluicing, would further increase the suspended sediment concentration downstream of the Dam
Determination: ***less than significant, no mitigation required, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including sluicing activities, which were discussed in WR-2, WR-3, and WR-4 in the Draft EIR/EIS.

Figure 4.2-25: Simulated Total Volume of Sediment Stored in the Carmel River Downstream from San Clemente Dam for the 41-year Simulation, Wet-year Hydrology

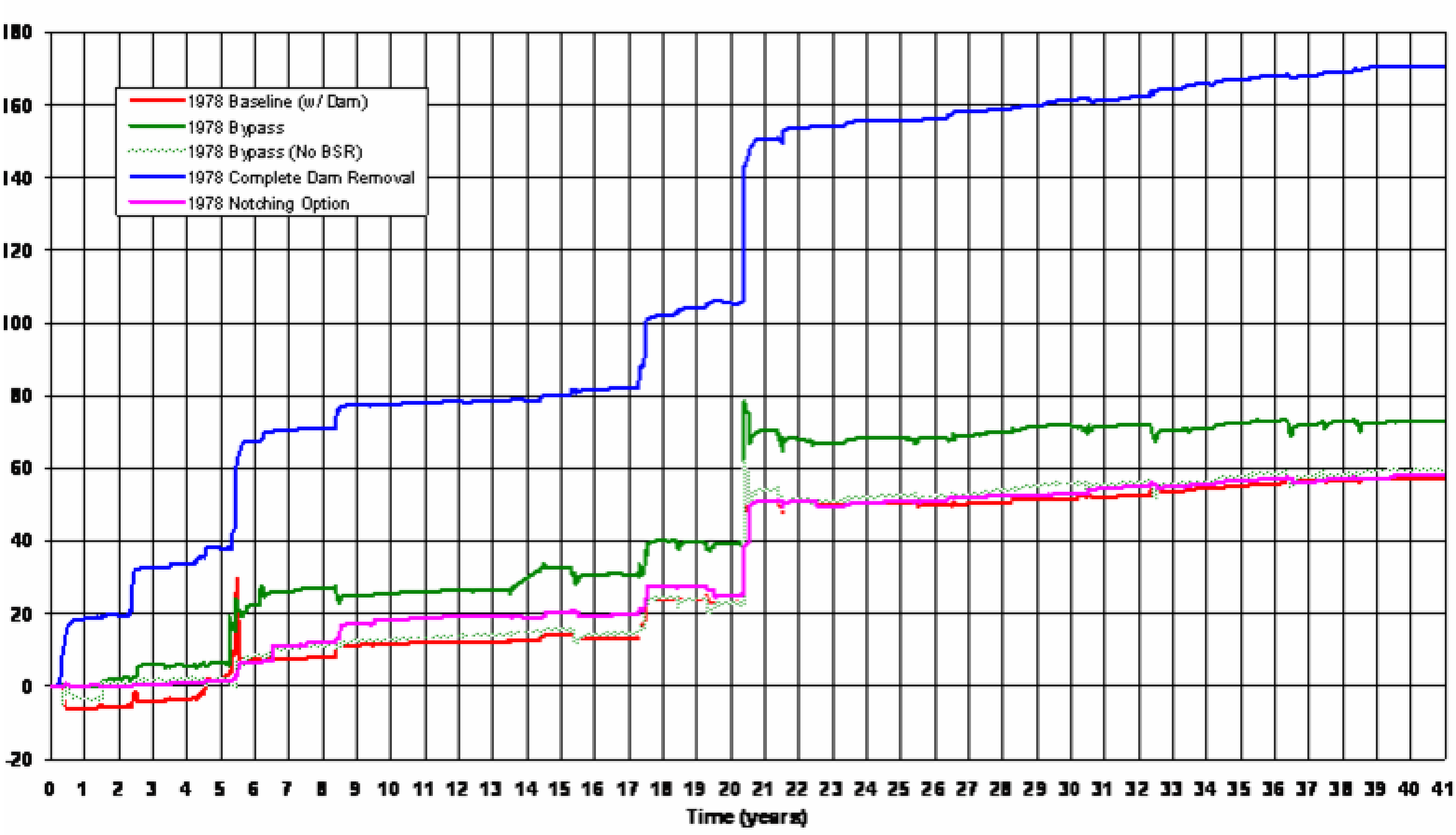


Figure 4.2-26: Simulated Total Volume of Sediment Stored in the Carmel River Downstream from San Clemente Dam for the 41-year Simulation, Dry-year Hydrology

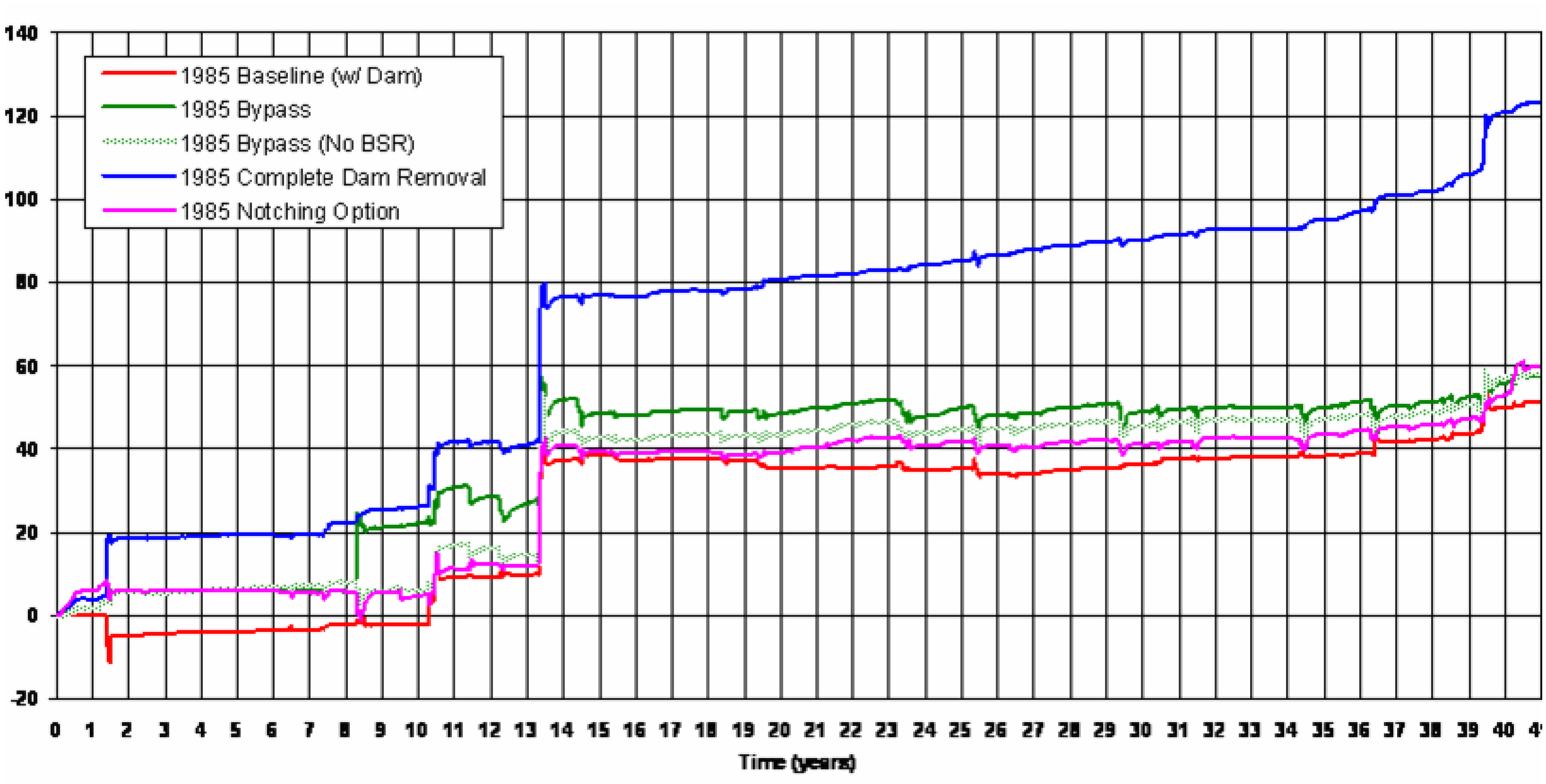


Figure 4.2-27: Maximum Difference in the 100-year Water Surface Elevation in the Carmel River for the Alternatives, Wet-year Hydrology

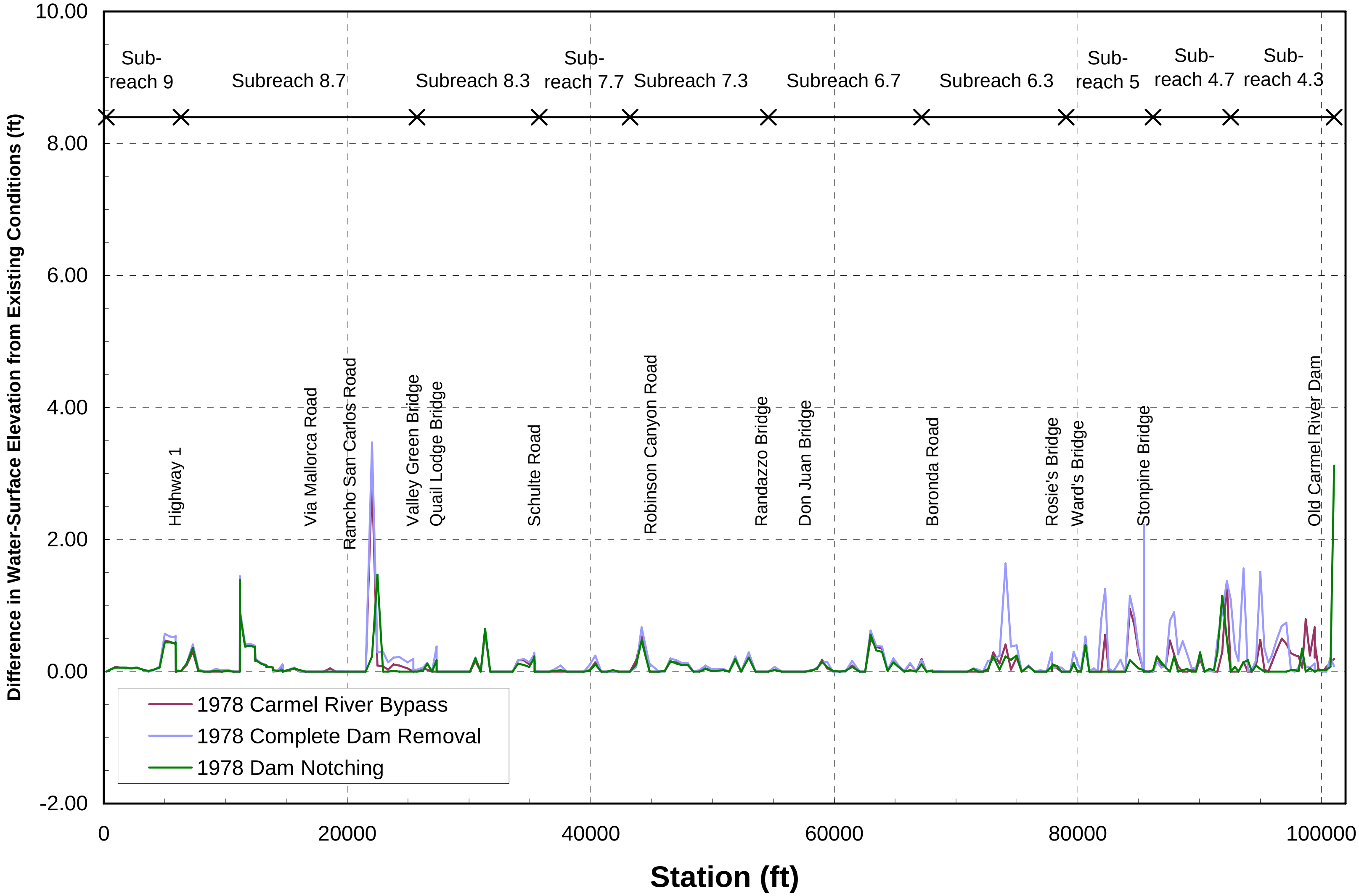
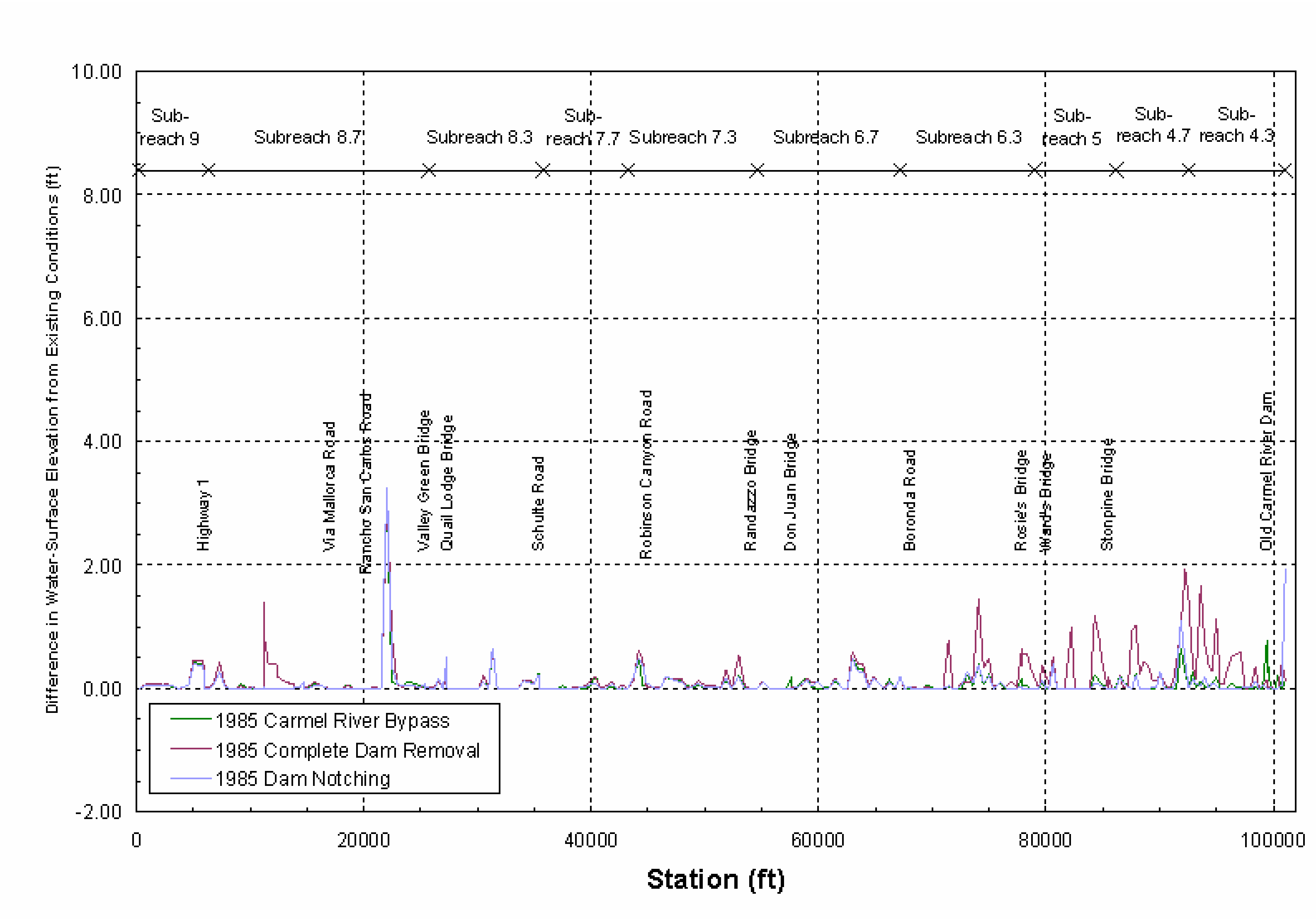


Figure 4.2-28: Maximum Difference in the 100-year Water Surface Elevation in the Carmel River for the Alternatives, Dry-year Hydrology



Implementing Alternative 1 would decrease the amount of sediment trapped in the reservoir, thereby increasing the downstream sediment load. This would result in higher suspended sediment loads during storm events. In addition, sediment management activities such as sluicing, would add to the suspended sediment concentration. However, comparing the difference between simulated storm events with and without sluicing, the percentage of days when the suspended sediment concentration exceeds 500 ppm is increased 0.03 percent for sluicing as indicated in Table 4.2-4.

Suspended sediment concentrations under Alternative 1 were estimated for the lower river based on the modeled sediment loading. The results indicated that the suspended sediment concentration responds to storm events that mobilize sediment (Figure 4.2-17 through Figure 4.2-19). A summary of suspended sediment concentration shows that the concentration is typically below 200 ppm (Table 4.2-6). There are from 23 to 37 days in the simulation period when the suspended sediment concentration exceeds 500 ppm for the wet-year hydrology, and from 23 to 40 days for the dry-year hydrology.

Table 4.2-6: Number of Days with Simulated Suspended Sediment Concentration within Defined Limits for Alternative 1

Wet-year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	**R4.7**	**R5**	**R6.3**	**R6.7**	**R7.3**	**R7.7**	**R8.3**	**R8.7**	**R9**
Less than 200	14,638	14,619	14,599	14,608	14,594	14,575	14,549	14,575	14,515	14,500
200-400	115	133	144	135	146	159	182	169	223	234
400-500	16	17	24	20	16	20	24	18	21	21
500-600	8	7	9	10	12	15	13	11	12	12
600-800	8	9	7	10	13	14	14	10	11	14
800-1000	3	2	3	3	3	2	3	2	3	4
1000-1200	2	3	3	3	2	1	1	2	3	3
1200-1400	1	1	2	2	3	4	3	3	2	2
1400-1600	0	0	0	0	2	1	2	1	1	1
1600-1800	1	0	0	0	0	0	0	0	0	0
1800-2000	0	1	0	0	0	0	0	0	0	0
>2000	0	0	1	1	1	1	1	1	1	1
Greater than 500	23	23	25	29	36	38	37	30	33	37
Dry-year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	**R4.7**	**R5**	**R6.3**	**R6.7**	**R7.3**	**R7.7**	**R8.3**	**R8.7**	**R9**
Less than 200	14,634	14,625	14,610	14,604	14,589	14,557	14,553	14,572	14,528	14,485
200-400	117	123	135	140	149	177	179	171	211	251
400-500	18	21	17	17	18	20	20	16	18	20
500-600	7	4	11	12	10	11	14	11	9	10
600-800	8	12	11	10	15	15	14	12	14	15
800-1000	5	3	3	3	3	4	3	3	3	2
1000-1200	1	2	2	3	4	4	4	2	5	5
1200-1400	1	1	2	2	1	1	2	2	1	1
1400-1600	0	0	0	0	2	2	2	2	2	2
1600-1800	1	1	0	0	0	0	0	0	0	0
1800-2000	0	0	0	0	0	0	0	0	0	0
>2000	0	0	1	1	1	1	1	1	1	1
Greater than 500	23	23	30	31	36	38	40	33	35	36

Note: Reach 4.3 is immediately below SCD. Reach 9 is at the lagoon. Simulation period is 41 years.

MITIGATION

No mitigation would be required (see discussion for the Proponent's Proposed Project under Impact Issue WR-4b).

WR-5: Changes in Channel Bed Geometry

Additional sediment passing the Dam to the lower river would aggrade or degrade the river channel or change the channel cross section
Determination: ***less than significant, no mitigation is required, long-term***

IMPACT

Alternative 1 would add 585 AF of sediment to the lower river, with 58 AF stored in the river in a wet-year. The additional sediment would add elevation to the channel bed or alter the channel cross section. Modeling results indicate that at several locations along the channel from the Dam to the ocean, the bed elevation would increase over one foot. However these changes would be localized to a small area and would not impact an entire river reach. Because of the limited extent, changes to the channel bed would not be extensive enough to adversely affect flood conditions in any river reaches. Therefore, this impact would be less than significant.

MITIGATION

In the Draft EIR/EIS, Impact Issue WR-5 was less than significant with mitigation. However, the changes in bed elevation under this alternative would be localized and would not extend throughout the river reach. These localized changes would not be significant and would not result in a wide-scale change in the river geometry. No mitigation would be required.

WR-6: Changes to the 100-year Flood Elevation

The increased sediment loading would alter the bed of the Carmel River and influence the 100-year flood elevation
Determination: ***less than significant, no mitigation required, long-term***

IMPACT

The changes in the downstream sediment loading would influence the bed elevation, which in turn, could alter the flood elevations. Modeling indicates that the bed changes are localized and are not present throughout a full reach in any part of the river. Therefore, these localized changes in bed elevation would not adversely affect flood conditions in any reach of river. This impact would be less than significant.

MITIGATION

In the Draft EIR/EIS, Impact Issue WR-6 was less than significant with mitigation. However, the impacts would be less than significant and no mitigation would be required.

Issue WR-7: Impact to the Location or Timing of Water Supply Diversions

Changes to the location or timing of water supply diversion
Determination: ***less than significant with mitigation, long-term***

IMPACT

Under Alternative 1, the existing CAW point of diversion would be replaced at an elevation of 525 ft. in the immediate vicinity of San Clemente Reservoir (see Section 3.3 of the Project Description). This would avoid the need for extensive improvements to the existing filter plant and would maintain the ability of CAW to divert water from the Carmel River. Alternative 1 would provide for a new water diversion point for the existing water right. The change in point of diversion would require approval of the SWRCB.

MITIGATION

In the Draft EIR/EIS the determination for Impact Issue WR-7 was less than significant and no mitigation was required. Comments to the Draft EIR/EIS pointed out that the diversion could affect fish passage. The diversion would be operated to maintain fish passage flows in Carmel River in January through May while also providing the necessary water supply to the downstream community. Any necessary mitigation for a change in a point of diversion would be addressed by the SWRCB during in the permit process. With mitigation, this impact would be less than significant.

Issue WR-8: Increased Risk of Dam Failure

Risk of dam failure due to seismic activity or flooding, leading to or increasing downstream flooding
Determination: ***less than significant, no mitigation required, long-term***

IMPACT

Please refer to Section 4.1 Geology and Impact Issue GS-1 for a discussion of seismic risks. Under Alternative 1, dam notching would eliminate the potential for dam failure during a MCE and/or PMF.

MITIGATION

In the Draft EIR/EIS, the mitigation discussion for this impact identified the Proponent's Proposed Project and other action alternatives as mitigation for this impact. However, no mitigation would be required for this impact as the San Clemente Dam Seismic Safety Project is designed to withstand a MCE and peak ground accelerations, a condition that cannot be met by the existing dam. The project would satisfy the EIR/EIS purpose and need of eliminating the potential for dam failure during the MCE.

Alternative 2 (Dam Removal)

Because the Dam would be removed, Hydrology/water resources impact WR-8 (Dam Failure) would not occur. Impact WR-7 (Water Supply) would be the same as described for Alternative 1, although the new water diversion would be located further upstream in order to provide the required head. Under Alternative 2, impact WR-2b is the same as impact WR-2a.

WR-1: Changes in Streamflow during Construction

Changes in streamflow downstream of the Dam during construction drawdown, dewatering the plunge pool, or when inflow exceeds the bypass capacity
Determination: ***less than significant, no mitigation required, short-term***

IMPACT

The impact potential would be the same as discussed above for Alternative 1, Impact Issue WR-1. During CY 4, 5, and 6, 1,000 AF of water stored in the reservoir would be released downstream over a 20-day period. The increase in discharge would be approximately 25 cfs, and would be within the range of variability observed for the recorded flows during this time period. This impact would be less than significant.

MITIGATION

No mitigation would be required (see discussion for the Proponent's Proposed Project under Impact Issue WR-1).

WR-2a: Changes in Sediment Flow Passing SCD Immediately After Construction

Changes in the amount of sediment transported from the upper watershed (above SCD) to the lower Carmel River (below SCD) immediately after construction
Determination: ***significant and unavoidable, short-term***

IMPACT

In the Draft EIR/EIS, Impact Issues WR-2 and WR-3 covered both construction and operational impacts. In this Final EIR/EIS, WR-2a includes the construction impacts discussed in WR-2 and WR-3 in the Draft EIR/EIS. Operational impacts are covered in Issues WR-3a, WR-3b, WR-4a, and WR-4b.

Sediment stored behind SCD would be excavated and removed under this alternative. Because of the difficulty in removing all sediment, a residual sediment layer would remain along the canyon walls and channel within the former reservoir. The sediment transport modeling assumed that a one-foot base of residual sediment would remain in the reservoir area after construction.

After years of being submerged by water, then by sediment, the canyon walls would lack stabilizing vegetation. The residual sediment layer would be composed of sands up through gravels, along with cobbles and boulders that pre-date the reservoir. The fine gravel would rapidly wash off the hillsides in rain events and would be available for transport downstream.

Because the Dam would be removed under Alternative 2, the full annual sediment load plus a portion of the residual sediment remaining in the reservoir area would pass the Dam site to the lower river.

MITIGATION

Following sediment excavation, geomorphically stable channels would be designed and constructed though the reservoir to the confluence of the San Clemente Creek and Carmel River channels. These channels would have the necessary slope and dimensions to convey the flow and estimated sediment loads. Channel reconstruction would take place though selective contouring along both the Carmel River and San Clemente Creek, to achieve the following objectives:

- The formation of a relatively wide river/creek valley by the remaining alluvial deposits that would generally follow the 1921 contours along the upper reaches of the river/creek and into the reservoir.
- The creation of a bankfull channel approximately sized for a two-year flood event.
- The creation of a low flow channel capable of passing median annual flows.
- The bankfull and thalweg channels would be constructed with limited grading of the existing alluvial deposits. Bank stabilization procedures such as vegetative matter and plantings would be used to limit erosion and sediment transport. (MWH 2005).

A stream restoration plan will be prepared as part of final design for this alternative, and will include mitigation for the increase in sediment supply following construction. Revegetation of the hillsides would also reduce the long-term potential for sediment erosion as discussed in Appendix K (SWPPP) and Appendix U (Botanical Resources Management Plan).

However, even with the mitigation discussed above, the short-term impact will be significant and unavoidable.

WR-3a: Change in Sediment Deposition in the Reservoir

Changes in the amount of sediment deposited in the reservoir upstream of the SCD
Determination: ***less than significant, no mitigation required, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including issues discussed in WR-2, WR-3 and WR-4 in the Draft EIR/EIS.

At the end of construction, sediment would only be trapped upstream of the current SCD in the floodplain of the reconstructed channel. The channel and floodplain would be designed to pass low-flows and flood-flows and convey the sediment load. Therefore, any deposition in the channel would be within the expected design limits and would not be a significant impact.

Alternative 2 would allow the background sediment load of the river to flow, unimpeded, downstream. The natural sediment load present upstream of the reservoir has not been available to the lower river since before the Dam was constructed.

The Carmel River and San Clemente Creek channels upstream of the Dam would be re-constructed at a slope similar to the pre-dam channel slope. Through the reservoir, this would be a steep slope compared to existing conditions and the river would efficiently transport sediment through the reconstructed channel. Sediment would continue to be stored in the floodplain of each watercourse through the reservoir area during moderate flows and would be released from the floodplain during high flows. Over the long-term, under Alternative 2, the full natural sediment load would be conveyed downstream to the lower Carmel River. The assumed channel cross sections used in the sediment transport modeling are shown in Figure 4.2-29 and Figure 4.2-30

Under this Alternative, the reservoir would be drawn down prior to demolition of the Dam. Under Alternative 2 an estimated 1,555 AF of sediment would be removed from behind the Dam to near the depth of the 1921 streambed.

The existing reservoir area cannot be completely excavated to remove the stored sediment because of the underlying canyon shape and the presence of obstacles such as large rocks. The canyon hillsides that were previously inundated would be barren for several years until vegetation becomes established. Until that time, the hillsides of the former reservoir would be subject to erosion or possible landslides that would add additional sediment to the river.

The sediment transport simulations suggest that only a small amount of sediment would accumulate upstream of the current location of the Dam under this alternative. The amount of accumulated sediment is simulated to be 4 AF for the wet-year and 3 AF for the dry-year hydrology at the end of the 41 year simulation. The stored sediment would occur in the overbank areas (the floodplain) of the reconstructed channels of the Carmel River and San Clemente Creek.

MITIGATION

This impact would be less than significant, and no mitigation would be required. This is consistent with the Draft EIR/EIS text, where long-term sediment management operational issues were identified as less than significant after mitigation and potentially beneficial.

Figure 4.2-29: Typical Cross Section for the Alternative 2 (Complete Dam Removal) in the San Clemente Creek Arm

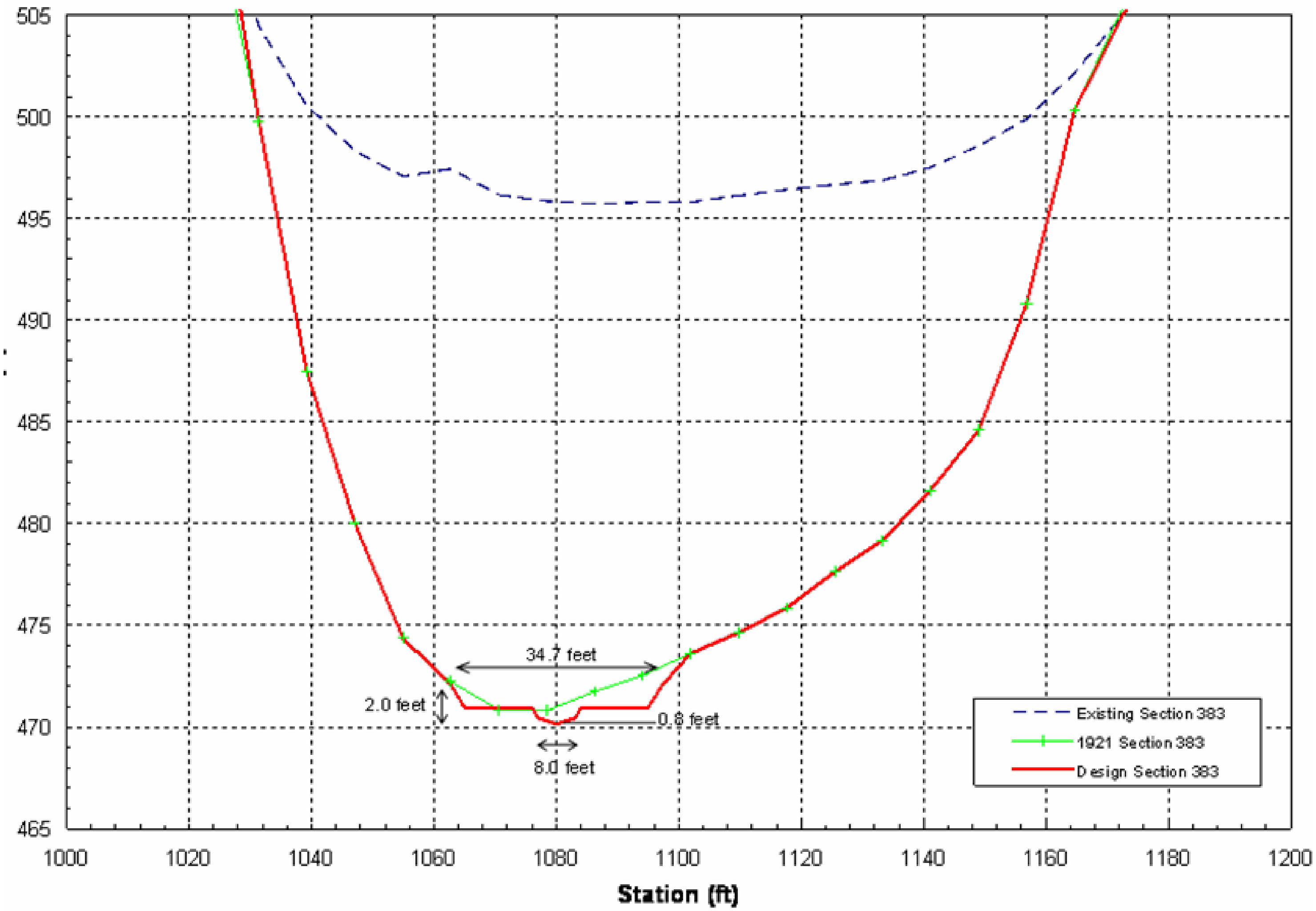
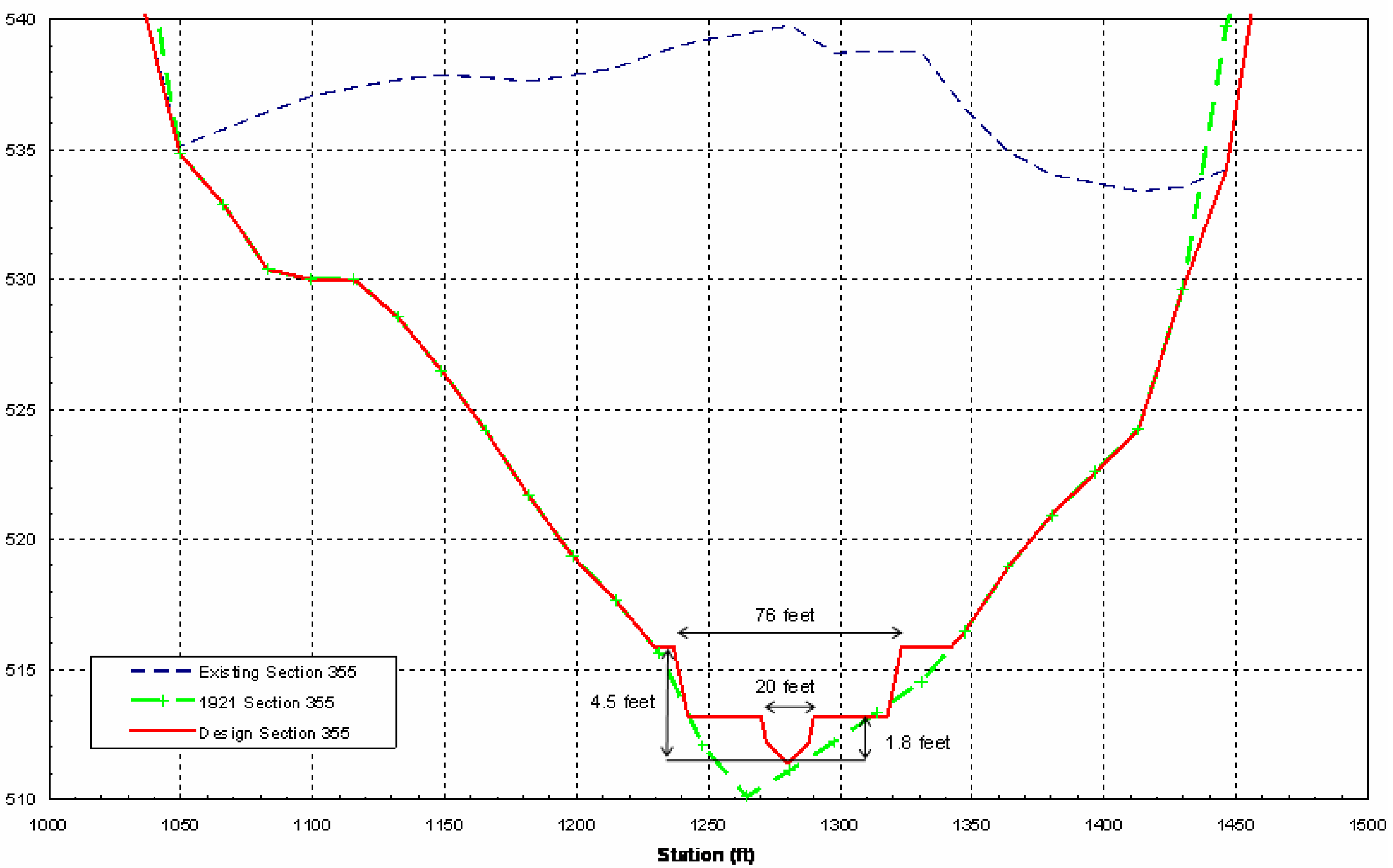


Figure 4.2-30: Typical Cross Section for the Alternative 2 (Complete Dam Removal) in the Carmel River Arm



WR-3b: Increased Sediment Deposition that Obstructs Fish Passage

During low-flow years, when all the flow is through the fish ladder, sediment would move close to the fish ladder, and possibly impair fish passage from the ladder to the remnant pool
Determination: ***less than significant, no mitigation required, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction that were discussed in WR-2, WR-3 and WR-4 in the Draft EIR/EIS.

The only potential fish passage obstruction under this alternative would occur from deposition in the restored channel upstream of the Dam. As stated above under WR-3a, the channel would be designed to pass low-flows and flood-flows and convey the sediment load. Therefore, blockage should not occur near the existing SCD site. This would be a less than significant impact.

MITIGATION

This impact would be less than significant and no mitigation would be required. This is consistent with the Draft EIR/EIS text, where long-term sediment management operational issues were identified as less than significant after mitigation and potentially beneficial.

WR-4a: Increased Sediment Deposition in the Lower River

Increased sediment load passing SCD and depositing in the Carmel River bed below SCD
Determination: ***significant and unavoidable, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction that were discussed in WR-2, WR-3 and WR-4 in the Draft EIR/EIS.

Implementing Alternative 2 would result in a larger amount of sediment flowing past the Dam to the lower river than the other alternatives (Table 4.2-3 and Figure 4.2-24).

The full annual natural sediment load would pass downstream of SCD site under this alternative. This condition has not occurred in the lower river for 86 years. Furthermore, the current downstream channel has adjusted to the reduced sediment supply. Alternative 2 would result in the largest sediment accumulation in the lower river of all the alternatives (Figure 4.2-25 and Figure 4.2-26). Under the 41-year simulation, about 669 AF of sediment would pass downstream and 170 AF would be stored in the lower river for the wet-year and about 670 AF of sediment would pass downstream and 123 AF would be stored in the lower river for the dry-year hydrology. Of the sediment stored in the lower river, about 40 AF would be medium gravel to coarse gravel.

By removing the Dam under Alternative 2, there would no longer be any control on the movement of sediment to the lower river. The natural background load plus the residual sediment in the reservoir area would move downstream. In addition, any event that generates excess sediment, such as a wildfire or landslide would add sediment that would flow directly to the lower river.

The sediment that deposits in the lower river may influence localized flooding. The results of the sediment transport analysis showed that the bed of the river would be raised by the deposition of sediment downstream of SCD (Figure 4.2-27 and Figure 4.2-28). The increase in be elevation would be localized and not present throughout a river reach.

Increases in bed elevation of more than one foot were simulated for Reaches 8.7, 6.3, 5, 4.7, and 4.3 for the wet-year hydrology. The increase in Reach 8.7 would be 3.5 feet; in the upstream reaches, elevations would increase by 1 to 2.1 feet over baseline. Under the dry-year hydrology, the bed elevation would increase over the baseline by more than one foot in Reaches 8.3 and 4.7, and in reach 8.7 by 3.1 feet.

MITIGATION

In the Draft EIR/EIS, long-term sediment management operational issues were identified as less than significant after mitigation and potentially beneficial. However, the additional studies performed to measure sediment load indicated that under Alternative 2, increased sediment deposition in the Carmel River below the SCD site would be significant and unavoidable and could not be mitigated.

WR-4b: Increase in Frequency of High Suspended Sediment Concentrations

High flows will increase sediment concentration in the river and sediment management activities, such as sluicing, would further increase the suspended sediment concentration downstream of the Dam
Determination: ***significant and unavoidable, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction that were discussed in WR-2, WR-3 and WR-4 in the Draft EIR/EIS. Operational sediment management activities, such as sluicing do not apply to Alternatives 2, 3, and 4.

However, the additional sediment load in the lower river would move downstream during high flows. This would result in higher suspended sediment concentrations relative to baseline conditions. Sediment modeling indicated that high concentrations would occur more frequently under this alternative.

Although sediment movement would occur with or without the Dam in place, a greater number of high suspended sediment concentration days would occur with SCD removed than when it is retained. Moreover, the lower river would be exposed to the full sediment load that would be present upstream of the reservoir, a condition that has not occurred in the lower river since before the Dam was built.

Simulated suspended sediment concentrations for the 41-year period for Alternative 2 are shown in Figure 4.2-17 through Figure 4.2-19. The concentration would be typically less than 200 ppm but would increase during storm events. Table 4.2-7 shows the simulated number of days that suspended sediment concentrations would increase. Throughout most of the 41-year simulation period, suspended sediment concentrations would be less than 200 ppm. However, Alternative 2 would result in a larger number of days with higher concentrations than the baseline.

Table 4.2-7: Number of Days with Simulated Suspended Sediment Concentration within Defined Limits for Alternative 2

Wet-year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	**R4.7**	**R5**	**R6.3**	**R6.7**	**R7.3**	**R7.7**	**R8.3**	**R8.7**	**R9**
Less than 200	14,492	14,504	14,488	14,508	14,530	14,519	14,529	14,537	14,488	14,487
200-400	233	223	244	227	198	200	196	198	241	248
400-500	18	23	20	18	19	26	26	22	25	17
500-600	18	17	14	15	16	17	14	11	13	15
600-800	18	12	14	11	16	15	13	14	13	14
800-1000	6	7	4	6	4	5	5	2	4	4
1000-1200	4	3	3	2	3	3	3	3	4	2
1200-1400	1	1	4	3	3	3	3	2	1	2
1400-1600	1	1	0	1	2	2	2	2	2	2
1600-1800	0	0	0	0	0	0	0	0	0	0
1800-2000	0	0	0	0	0	1	0	0	0	0
>2000	1	1	1	1	1	1	1	1	1	1
Greater than 500	49	42	40	39	45	47	41	35	38	40
Dry-year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	**R4.7**	**R5**	**R6.3**	**R6.7**	**R7.3**	**R7.7**	**R8.3**	**R8.7**	**R9**
Less than 200	14,480	14,520	14,514	14,542	14,532	14,522	14,514	14,521	14,463	14,460
200-400	248	215	225	191	195	199	207	213	262	268
400-500	23	22	13	21	24	28	27	20	26	25
500-600	17	13	18	14	14	16	17	14	14	13
600-800	10	11	10	12	13	14	12	13	14	13
800-1000	8	5	5	5	6	5	6	2	4	4
1000-1200	3	4	4	2	3	2	3	3	3	5
1200-1400	1	0	1	3	2	3	3	3	3	1
1400-1600	1	1	1	1	2	2	2	2	2	2
1600-1800	0	0	0	0	0	0	0	0	0	0
1800-2000	0	1	0	0	0	0	0	0	0	0
>2000	1	0	1	1	1	1	1	1	1	1
Greater than 500	41	35	40	38	41	43	44	38	41	39

Note: Reach 4.3 is immediately below SCD. Reach 9 is at the lagoon. Simulation period is 41 years.

There would be between 35 and 49 days with the concentration exceeding 500 ppm under the wet-year hydrology and 35 to 44 days under the dry-year hydrology.

Appendix P shows that suspended sediment concentrations under Alternative 2 would be the highest of all the project alternatives from Reach 4.7 downstream to Reach 8.7, at which point concentrations would become similar to the other alternatives. For example, at Reach 4.7, a concentration of 300 ppm would be exceeded about five percent of the time under Alternative 2 and about one percent of the time under the other project alternatives (Figure P-2). This alternative is simulated to have the highest frequency of suspended sediment concentration above about 300 ppm for reach 4.3 (Figure P-1).

MITIGATION

In the Draft EIR/EIS, this impact issue was identified as less than significant after mitigation and potentially beneficial. However, the additional studies performed to measure suspended sediment concentrations show that under Alternative 2, increases in frequency of high suspended sediment concentrations would be significant and unavoidable and could not be mitigated.

WR-5: Changes in Channel Bed Geometry

Additional sediment passing the Dam to the lower river would aggrade or degrade the river channel or change the channel cross section
Determination: ***significant and unavoidable, long-term***

IMPACT

Based on sediment transport modeling, 170 AF of sediment would be stored in the lower river for the 41-year simulation (for wet-year hydrology). This would be three times the level simulated for the baseline. The deposition would result in increases of more than one foot relative to the baseline in the channel bed elevation in Reaches 8.7, 6.3, 5, 4.7, and 4.3 of the river. While each of these increases would be localized in each of these reaches, the extent of the increases reflect changes to the channel cross section that would force the river to adjust to maintain equilibrium.

MITIGATION

In the Draft EIR/EIS, long-term changes in channel bed geometry were identified as less than significant after mitigation. However, the additional studies performed to measure sediment load show that under Alternative 2, changes in channel bed geometry would be significant and unavoidable and could not be mitigated.

WR-6: Changes to the 100-year Flood Elevation

The increased sediment loading would alter the bed of the Carmel River and influence the 100-year flood elevation
Determination: ***significant and unavoidable, long-term***

IMPACT

Modeling results indicate that at several cross sections of the lower river, the bed elevation would increase under this alternative. Such an increase in the channel bed could cause floodwater to break out of the channel or result in additional erosion in the channel. This result would be most notable in Reach 4.7 and Reach 4.3, where there are numerous cross sections with increased bed elevations of one to two feet. This could potentially result in flooding because much of the buildup of the channel bed would result from an increase in the amount of coarse material that passes SCD under this alternative. This material does not move as easily as the finer grained material of the baseline condition and may not wash from the channel during a flood.

MITIGATION

Under Alternative 2, the Applicant would monitor the downstream sediment accumulation to measure changes in bed elevation. The 100-year flood model would be rerun to estimate flood elevations if bed elevations have increased by more than 0.5 feet from the baseline condition. If the flood model indicates flooding would impact developed areas due to these bed elevations changes, the Applicant would work with the appropriate agencies to initiate a channel restoration project to remove sediment and reduce the impact. In the Draft EIR/EIS, long-term changes to the 100-year floodplain were identified as less than significant after mitigation. However, the additional studies performed to measure sediment load show that even with mitigation, under Alternative 2, changes to the 100-year floodplain would be significant and unavoidable.

Alternative 3 (Carmel River Reroute and Dam Removal)

Impacts and mitigation for Hydrology/Water Resources Issues WR-1 (Changes in Streamflow), WR-2a, and WR-2b would be similar to those described for Alternative 2. Issues WR-6 and WR-7 would be similar to those described in Alternative 1. Impact Issue WR-8 (Dam Failure) would not occur under Alternative 3, since the Dam would be removed.

WR-3a: Change in Sediment Deposition in the Reservoir

Changes in the amount of sediment deposited in the reservoir upstream of SCD
*Determination: **less than significant, no mitigation required, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including issues discussed in WR-2, WR-3 and WR-4 in the Draft EIR/EIS.

This impact would differ from conditions described under Alternative 2 in that additional sediment storage would occur in the Carmel River reservoir area. The storage would occur upstream of the diversion dike. About 97 AF would be stored in the reservoir for the 41-year simulation and about 576 AF would pass SCD. There would also be storage in the floodplain of the reconstructed channel in the San Clemente Creek arm.

Under Alternative 3, the Dam would be removed and a channel constructed that would divert water from the Carmel River to San Clemente Creek. The upstream end of the new channel would have a diversion dike to maintain a stable bed elevation for the

Carmel River upstream of the new channel. The Carmel River upstream of the dike is within the reservoir and therefore, the channel has formed on sediment deposits. Without this dike, the Carmel River bed would degrade until it reaches equilibrium or bedrock in the channel. Bedrock is about 30 feet below the surface sediments at the location of the dike. Figures illustrating the diversion dike (see Chapter 3.0 Project Description) include 3.5-1, 3.5-2, and 3.5-3. Additional information on the construction of the dike is located in Section 3.5.4.

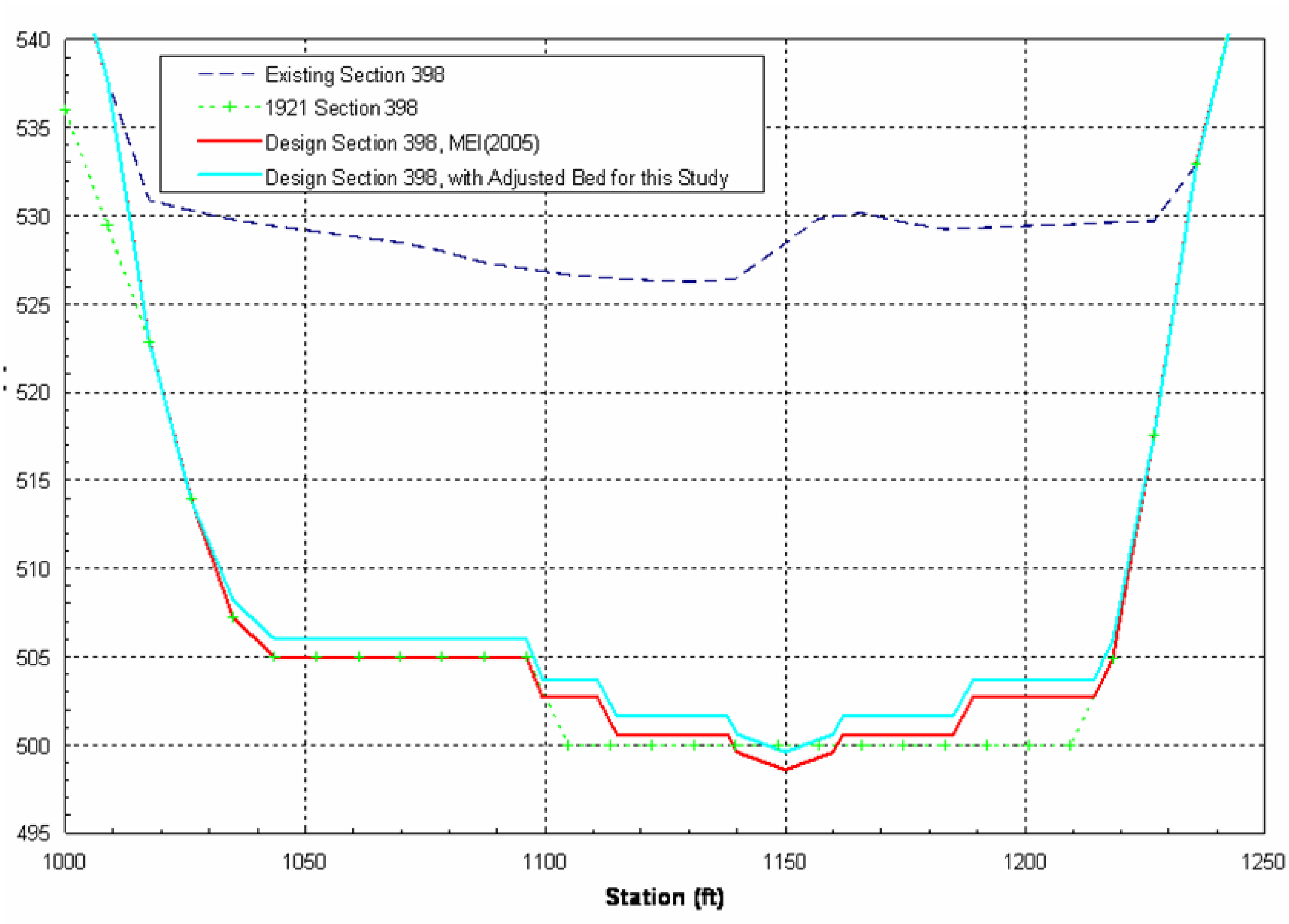
Following dam removal and sediment excavation and stabilization as described in Chapter 3.5, a geomorphically stable channel would be constructed upstream from the dam site through the area exposed by excavation to the natural channel bed in San Clemente Creek. A new bypass channel would be constructed from San Clemente Creek to the Carmel River. The channels would be designed with the appropriate slopes and dimensions to convey the estimated sediment loads without excessive deposition or scour (Figure 4.2-31). The sediment in the San Clemente Creek arm would be relocated to the Carmel River arm downstream of the bypass channel and capped to isolate the sediment from river flows. The bypass channel would be geomorphically stable and maintain grade-control to limit erosion of the existing deposits upstream from the head of the inlet (MEI 2005).

Alternative 3 would result in reservoir-area sediment storage similar to Alternative 1. About 97 AF of sediment would be stored in the reservoir for the wet-year, and 117 AF for the dry-year hydrology. The sediment would be stored in the Carmel River upstream of the dike and in the floodplain of the reconstructed channel through the San Clemente Creek arm (Figure 4.2-22 and Figure 4.2-23). The amount of sediment passing SCD to the lower river would be less than the total sediment supplied to the reservoir. About 556 AF and 576 AF of sediment would pass SCD to the lower river for the wet and dry-year hydrology, respectively.

MITIGATION

This impact would be less than significant and no mitigation would be required. This is consistent with the Draft EIR/EIS text, where long-term sediment management operational issues upstream of the dam site were identified as less than significant after sediment excavation and design of geomorphically stable channels.

Figure 4.2-31: Typical Cross Section for Alternative 3 (Carmel River Bypass) in the San Clemente Creek Arm



WR-3b: Increased Sediment Deposition that Obstructs Fish Passage

During low-flow years, when all the flow is through the fish ladder, sediment would move close to the fish ladder, and possibly impair fish passage from the ladder to the remnant pool
Determination: ***less than significant with mitigation, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including issues discussed in WR-2, WR-3 and WR-4 in the Draft EIR/EIS.

Potential for blockage of fish passage would occur under this alternative from deposition in the channel and at the diversion dike. The channel upstream of the diversion dike would have a low-flow channel that allows fish passage. This channel would continue to function as it has in the past and fish passage would be available. Fish also would have to traverse the bypass channel and the dike to move from the San Clemente Creek arm to the Carmel River arm. The bypass channel and the San Clemente Creek channel would be steep (2.9 percent) relative to the current channel through the stored sediment (2.5 percent), but not be so steep as to become a barrier to fish migration.

MITIGATION

Both the reconstructed channel and the new bypass channel must be designed to allow fish passage. The design would include runs and pools that reflect a geomorphically stable channel and the passage requirements for the fish. This impact is less than significant with mitigation. This is consistent with the Draft EIR/EIS where long-term sediment management operational issues were identified as less than significant after sediment excavation and design of the geomorphically stable channels.

WR-4a: Increased Sediment Deposition in the Lower River

The increased sediment load passing SCD deposit in the Carmel River bed below SCD
Determination: ***less than significant, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including issues discussed in WR-2, WR-3 and WR-4 in the Draft EIR/EIS.

Alternative 3 would result in additional sediment passing SCD and being stored in the lower river relative to existing conditions. The sediment would include coarse gravels that were not previously available to the lower river. The magnitude of the sediment flow would be similar to Alternative 1. However, because the Dam would be removed, large sediment flows from the watershed from extreme events such as fires could not be controlled and would move downstream.

The sediment that passes SCD would be stored in the lower river or would flow to the ocean. Under the 41-year simulation about 576 AF of sediment would pass SCD during a wet year and 556 AF would pass the Dam during a dry year. About 73 AF of the sediment passing the Dam would be stored in the lower river for the wet-year and 57 AF for dry-year hydrology.

The stored sediment would change bed elevation. In several locations, the increase in bed elevation relative to baseline would exceed one foot. This would occur in Reaches 8.7, 5, and 4.7 for the wet-year hydrology. Under the dry-year hydrology, this would occur in Reach 8.7 and Reach 4.7. Because these changes are very localized, these impacts would be less than significant. Flooding and changes in local bed geometry are discussed in WR-5 and WR-6 below.

MITIGATION

Under Alternative 3, this impact would not be significant and no mitigation would be required.

WR-4b: Increase in Frequency of High Suspended Sediment Concentrations

High flows will increase sediment concentration in the river and sediment management activities, such as sluicing, would further increase the suspended sediment concentration downstream of the Dam
Determination: ***significant and unavoidable, long-term***

IMPACT

In this Final EIR/EIS, Impact Issues WR-3a, WR-3b, WR-4a, and WR-4b cover sediment management operations after construction, including issues discussed in WR-2, WR-3 and WR-4 in the Draft EIR/EIS. Operational sediment management activities, such as sluicing do not apply to Alternatives 2, 3 and 4.

However, sediment would be trapped in the reservoir area under this alternative, but the downstream suspended sediment concentration would not experience the high sediment concentrations as often as Alternative 2. The limit of 500 ppm would be exceeded from 29 to 42 times under the wet-year hydrology and from 27 to 38 times in the dry-year hydrology (Table 4.2-8). These impacts would be significant and unavoidable.

MITIGATION

In the Draft EIR/EIS, long-term sediment management operational issues were identified as less than significant after mitigation and potentially beneficial. However, the additional studies performed to measure suspended sediment concentrations show that under Alternative 3, increases in frequency of high suspended sediment concentrations would be significant and unavoidable and could not be mitigated.

Table 4.2-8: Number of Days with Simulated Suspended Sediment Concentration within Defined Limits for Alternative 3

Wet-year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	**R4.7**	**R5**	**R6.3**	**R6.7**	**R7.3**	**R7.7**	**R8.3**	**R8.7**	**R9**
Less than 200	14,593	14,584	14,574	14,581	14,569	14,550	14,557	14,563	14,509	14,501
200-400	147	157	170	155	162	176	174	176	224	233
400-500	19	22	18	22	23	24	23	20	23	23
500-600	9	11	10	11	12	16	12	12	13	11
600-800	14	8	10	12	14	15	14	11	11	14
800-1000	5	5	4	5	4	3	4	3	4	3
1000-1200	3	2	3	3	3	3	2	2	4	3
1200-1400	1	2	2	2	2	2	3	3	1	2
1400-1600	0	0	0	0	2	2	2	1	2	1
1600-1800	0	0	0	0	0	0	0	0	0	0
1800-2000	1	1	0	0	0	0	0	0	0	0
>2000	0	0	1	1	1	1	1	1	1	1
Greater than 500	33	29	30	34	38	42	38	33	36	35
Dry-year Hydrology										
Concentration (ppm)	**Reach**									
	R4.3	**R4.7**	**R5**	**R6.3**	**R6.7**	**R7.3**	**R7.7**	**R8.3**	**R8.7**	**R9**
Less than 200	14,622	14,610	14,586	14,595	14,589	14,565	14,571	14,567	14,519	14,506
200-400	124	138	158	144	147	163	159	174	213	231
400-500	19	17	19	20	18	26	24	18	22	18
500-600	8	10	8	12	15	13	12	11	13	12
600-800	10	7	11	11	12	13	14	11	13	12
800-1000	3	4	3	3	2	3	3	4	3	4
1000-1200	4	4	4	3	3	3	4	3	5	5
1200-1400	0	1	2	2	3	3	2	1	1	1
1400-1600	1	0	0	1	2	2	2	2	2	2
1600-1800	0	0	0	0	0	0	0	0	0	0
1800-2000	1	1	0	0	0	0	0	0	0	0
>2000	0	0	1	1	1	1	1	1	1	1
Greater than 500	27	27	29	33	38	38	38	33	38	37

Note: Reach 4.3 is immediately below SCD. Reach 9 is at the lagoon. Simulation period is 41 years.

WR-5: Changes in Channel Bed Geometry

The additional sediment passing the Dam to the lower river would aggrade or degrade the river channel or change the channel cross section
Determination: ***less than significant, no mitigation is required, long-term***

IMPACT

The alternative would add 556 AF of sediment to the lower river, with 73 AF stored in the river in a wet-year. In a dry-year, it would add 576 AF to the lower river with 57 AF stored in the river. The additional sediment would add elevation to the channel bed or alter the channel cross section. Modeling results indicate that at several locations along the channel from the Dam to the ocean, the stored sediment would increase bed elevation relative to the baseline by over one foot. This would occur in Reaches 8.7, 5, and 4.7 for the wet-year hydrology. Under the dry-year hydrology, this would occur in Reach 8.7 and Reach 4.7. These changes would be localized and therefore would not impact an entire river reach. Additionally, changes to the channel bed geometry would not be large enough to adversely affect flood conditions in any reach of the river.

MITIGATION

The changes in bed elevation under this alternative are localized and do not extend throughout the river reach. These localized changes are not significant and would not result in a wide-scale change in the river geometry. No mitigation would be required. This is consistent with the Draft EIR/EIS text, where long-term sediment management operational issues upstream of the dam site were identified as less than significant after sediment excavation and design of geomorphically stable channels.

Alternative 4 (No Project)

Hydrology/Water Resources Issues WR-1, WR-2a, WR-2b, and WR-7 would not apply to the No Project Alternative because construction that creates these impacts would not occur and the water supply location would not be altered. Issues WR-4a, WR-5, WR-6 would be similar to those described for the Proponent's Proposed Project (however, benefits of implementing the SOMP would not occur).

Under the No Project Alternative, mitigation would not be provided beyond flows and other safeguards currently provided under the existing Interim Drawdown Memorandum of Understanding (MOU) and NMFS Conservation Agreement and any other current regulatory obligations.

Under the No Project Alternative, reservoir drawdowns as required by the Interim Seismic Safety Measures would continue annually until the reservoir fills with sediment. Since annual drawdowns typically occur during the low flow season, they would not affect high flows in the river. As the reservoir continues to fill with sediment, the water storage capacity in the reservoir would ultimately be negligible and would consist only of the remnant pool.

Alternative 4 and the Proponent's Proposed Project have a similar configuration of the Dam and therefore have similar influences on the sediment load for the 41-year simulation. However, the trap efficiency in the reservoir would be slightly higher in the near term under Alternative 4 because of the lack of sediment management. The modeling results for this alternative were previously discussed under the Proponent's Proposed Project and are described in the figures and tables as the Baseline Condition.

The simulated sediment stored in the reservoir under No Project is shown in Figure 4.2-22 and Figure 4.2-23 and would be the same as the discussion under the Proponent's Proposed Project.

The simulated sediment load passing SCD under No Project is shown in Figure 4.2-24 and would be the same as the discussion under the Proponent's Proposed Project.

The downstream sediment concentration under No Project is shown in Figure 4.2-17 through 4.2-19 and summarized in Table 4.2-5. The high sediment concentration would continue to occur during storm events.

Issue WR-3a: Change in Sediment Deposition in the Reservoir

Changes in the amount of sediment deposited in the reservoir upstream of SCD
Determination: ***less than significant, no mitigation available, long-term***

IMPACT

Sediment flowing into San Clemente Reservoir will fill the remaining capacity in six to ten years at the current rate. After filling, a remnant pool will remain, with the size of the pool a function of the recent storm pattern and magnitude of storms.

This filling process is a continuation of the current pattern of trapping the inflowing sediment. Alternative 4 does not change this pattern or alter the rate of filling. This impact is less than significant.

MITIGATION

No mitigation is available for this impact. The reservoir will continue to fill, leaving only the remnant pool.

WR-3b: Increased Sediment Deposition that Obstructs Fish Passage

During low-flow years, when all the flow is through the fish ladder, sediment would move close to the fish ladder, and possibly impair fish passage from the ladder to the remnant pool
Determination: ***significant, unavoidable, long-term***

IMPACT

Under Alternative 4, potential increases in sediment deposition that could obstruct upstream fish passage would be significant and unavoidable and would not be mitigated.

MITIGATION

No mitigation would be provided under the No Project alternative.

WR-4b: Increase in Frequency of High Suspended Sediment Concentrations

High flows will increase sediment concentration in the river and sediment management activities, such as sluicing, would further increase the suspended sediment concentration downstream of the Dam
Determination: ***less than significant, no mitigation required, long-term***

Operational sediment management activities, such as sluicing do not apply to Alternatives 2, 3, and 4. However, during high flow events, the sediment concentration in the lower river will increase. This increase is the same as would be experienced under existing conditions. Therefore, this impact is less than significant.

MITIGATION

No mitigation would be provided under the No Project alternative.

WR-8: Increased Risk of Dam Failure

Risk of dam failure due to seismic activity or flooding, leading to or increasing downstream flooding
Determination: ***significant and unavoidable, long-term***

IMPACT

Downstream reaches of the Carmel River would be impacted if SCD were to fail. In the case of a PMF and dam failure, the estimated peak flow of 81,000 cfs would overtop the channel and floodwaters would spread out onto the floodplain. WCC (1997a) estimated that floods 1 to 6 feet deep would occur on the floodplain at least 3 miles downstream of the Dam along subreaches 4.3, 4.7, and 5. Effects along the lowermost reaches (subreach 9) are unknown, but no flooding was reported in this area from previous flood events.

The sediment released due to dam failure would also impact the downstream reaches of the Carmel River. The 1,555 AF of sediment trapped in the reservoir would be subjected to suspension and subsequent transport. The quantity of sediment that would be transported following dam failure would depend on several factors, such as the duration and size of storm flows. Substantially more sediment would be released as a result of dam failure during a flood than would occur under in a dry weather dam failure (e.g., due to the MCE).

The volume of sediment would cause aggradation of the channel bed, likely raising the bed by more than one foot. This would impact the hydraulics of the channel and the capacity of the channel to hold flood waters.

The composition of sediment released during a dam failure would range from coarse sands and gravels to fine clays. Sediment would be deposited on the floodplain and along the downstream reaches near the mouth of the Carmel River.

Under the No Project Alternative, the flooding and sediment release impacts of a dam failure would be significant and unavoidable.

4.3 WATER QUALITY

This section describes the potential impacts of the San Clemente Seismic Safety Project on the water quality conditions of the Project Area. Water Quality resources includes mechanisms by which water quality would be potentially affected by the Proponent's Proposed Project and alternatives from both construction and operational activities influenced by the project. Additional information is provided in this Final EIR/EIS which clarifies and amplifies the information included in the Draft EIR/EIS. This environmental setting section was prepared using information developed from the documents provided by the Recirculated Draft Environmental Impact Report (Denise Duffy & Associates 2000), ENTRIX annual San Clemente Dam Drawdown reports (ENTRIX 2002, 2003b, 2004a, 2005, and 2006), and surface water quality monitoring reports (MPWMD 2003a MPWMD 2004). Water quality data and analyses are detailed in Appendix Q of this report. In addition, Appendices K and R contain the Stormwater Pollution and Prevention Plan (SWPPP) and the Spill Prevention, Containment and Countermeasure Plan (SPCC).

4.3.1 ENVIRONMENTAL SETTING

This section describes water quality conditions for each key location (upstream to downstream) at which project activities would take place. Only those parameters that would potentially be affected by the activities taking place during project construction and operations are discussed. The baseline environmental setting for purposes of impact comparison is defined through the year 2030. Water quality conditions that would be expected to change in this period are also described.

Water quality parameters are described using available data. Sources of existing water quality information in the Project Area include Monterey Peninsula Water Management District (MPWMD), surface water quality monitoring reports (MPWMD 2003a, MPWMD 2004), San Clemente Reservoir Drawdown monitoring reports (ENTRIX 2003b, ENTRIX 2004a, ENTRIX 2005a, ENTRIX 2006) and results from a surface water and porewater characterization project (ENTRIX 2002). A summary of available water quality data sources is provided in Table 4.3-1 and sampling locations for each source are depicted in Figure 4.3-1.

Carmel River and San Clemente Creek above San Clemente Reservoir

Three sources of water quality information are available for the Carmel River and San Clemente Creek above the reservoir. Water quality conditions in these reaches were measured daily for a minimum of five weeks in association with the 2004 through 2006 reservoir drawdown. The MPWMD has collected continuous surface water temperature data from both the Carmel River (since 1997) and San Clemente Creek (since 2003) above the reservoir (MPWMD 1998, MPWMD 2004). Additionally, pore water and surface water measurements were collected by ENTRIX (2002) to characterize conditions in the Carmel River and San Clemente Creek above the reservoir. The results of these studies show that for the period of monitoring, the water quality in these portions of the Carmel River and San Clemente Creek was generally good and was not affected by drawdown activities.

Table 4.3-1: Summary of Sources and Water Quality Data Collected in San Clemente Reservoir and Vicinity

Source	Location	Parameter	Water Years	Months
MPWMD	Sleepy Hollow Weir	Temperature	1992 - 1996	Oct 1 - Sept 30
	Sleepy Hollow Weir	Dissolved Oxygen	1992 - 1996	Oct 1 - Sept 30
	Sleepy Hollow Weir	pH	1992 - 1996	Oct 1 - Sept 30
	Sleepy Hollow Weir	Specific Conductance	1992 - 1996	Oct 1 - Sept 30
	Sleepy Hollow Weir	Temp - Continuous	1996	April 30 - Sept 30
	San Clemente Reservoir Outlet	Temperature	1991 - 1996	Oct 1 - Sept 30
	Sleepy Hollow Weir	Temperature	1997 - 2003	Oct 1 - Sept 30
	Sleepy Hollow Weir	Dissolved Oxygen	1997 - 2003	Oct 1 - Sept 30
	Sleepy Hollow Weir	pH	1997 - 2003	Oct 1 - Sept 30
	Sleepy Hollow Weir	Specific Conductance	1997 - 2003	Oct 1 - Sept 30
	Sleepy Hollow Weir	Visual Turbidity	1997 - 2002	Oct 1 - Sept 30
	Sleepy Hollow Weir	Turbidity (NTU)	2003	Oct 1 - Sept 30
	Sleepy Hollow Weir	Temp - Continuous	1997 - 2003	Oct 1 - Sept 30
	San Clemente Fish Ladder	Temp - Continuous	1997, 1999 - 2003	
	San Clemente Reservoir Surface	Temp - Continuous	1997 - 2002	March - September
	San Clemente Reservoir Surface	Temp - Continuous	2003	October - November
	San Clemente Reservoir Bottom	Temp - Continuous	1998 - 2003	
	San Clemente Creek	Temp - Continuous	2003	May 28 - Sept 30
	Above San Clemente Reservoir	Temp - Continuous	1997 - 2003	Oct 1 - Sept 30
CAW-Drawdown	Reservoir - profile & continuous	Temperature	2003, 2004, 2005, 2006	spring, summer
	Reservoir - profile & continuous	Dissolved Oxygen	2003, 2004, 2005, 2006	spring, summer
	Reservoir - profile & continuous	pH	2003, 2004	summer
	Reservoir - profile & continuous	Specific Conductance	2003, 2004	summer
	Reservoir - profile & continuous	Turbidity (NTU)	2003, 2004, 2005, 2006	spring, summer
	Carmel R Below Dam	Suspended Sediment	2003	summer
	Carmel R Below Dam	Temperature	2003, 2004	summer
	Carmel R Below Dam	Dissolved Oxygen	2003, 2004	summer
	Carmel R Below Dam	pH	2003, 2004	summer
	Carmel R Below Dam	Specific Conductance	2003, 2004	summer
	Carmel R Below Dam	Turbidity (NTU)	2003, 2004	summer
	Carmel R Above Reservoir	Temperature	2004	summer
	Carmel R Above Reservoir	Dissolved Oxygen	2004	summer
	Carmel R Above Reservoir	pH	2004	summer
	Carmel R Above Reservoir	Specific Conductance	2004	summer
	Carmel R Above Reservoir	Turbidity (NTU)	2004	summer
	San Clemente Ck Above Reservoir	Temperature	2004	summer
	San Clemente Ck Above Reservoir	Dissolved Oxygen	2004	summer
	San Clemente Ck Above Reservoir	pH	2004	summer
	San Clemente Ck Above Reservoir	Specific Conductance	2004	summer
	San Clemente Ck Above Reservoir	Turbidity (NTU)	2004	summer
	Carmel R longitudinal profile	Temperature	2004	summer
	Carmel R longitudinal profile	Dissolved Oxygen	2004	summer
	Carmel R longitudinal profile	pH	2004	summer
	Carmel R longitudinal profile	Specific Conductance	2004	summer
	Carmel R longitudinal profile	Turbidity (NTU)	2004	summer

Table 4.3-1: Summary of Sources and Water Quality Data Collected in San Clemente Reservoir and Vicinity, continued

Source	Location	Parameter	Water Years	Months
ENTRIX 2002	Carmel R Above Reservoir	Metals	2002	11/1/02
Surface water	Carmel R Above Reservoir	Alkalinity	2002	11/1/02
	Carmel R Above Reservoir	pH	2002	11/1/02
	Carmel R Above Reservoir	Specific Conductivity	2002	11/1/02
	Carmel R Above Reservoir	Ions	2002	11/1/02
	San Clemente Ck Above Reservoir	Metals	2002	11/1/02
	San Clemente Ck Above Reservoir	Alkalinity	2002	11/1/02
	San Clemente Ck Above Reservoir	pH	2002	11/1/02
	San Clemente Ck Above Reservoir	Specific Conductivity	2002	11/1/02
	San Clemente Ck Above Reservoir	Ions	2002	11/1/02
	Reservoir	Metals	2002	11/1/02
	Reservoir	Alkalinity	2002	11/1/02
	Reservoir	pH	2002	11/1/02
	Reservoir	Specific Conductivity	2002	11/1/02
	Reservoir	Ions	2002	11/1/02
	Carmel R Below Dam	Metals	2002	11/1/02
	Carmel R Below Dam	Alkalinity	2002	11/1/02
	Carmel R Below Dam	pH	2002	11/1/02
	Carmel R Below Dam	Specific Conductivity	2002	11/1/02
	Carmel R Below Dam	Ions	2002	11/1/02
			2002	
ENTRIX 2002	Above Reservoir adjacent to River	Metals	2002	11/1/02
Pore water	Above Reservoir adjacent to River	Alkalinity	2002	11/1/02
	Above Reservoir adjacent to River	pH	2002	11/1/02
	Above Reservoir adjacent to River	Specific Conductivity	2002	11/1/02
	Above Reservoir adjacent to River	Ions	2002	11/1/02
	Above Reservoir on sand bar	Metals	2002	11/1/02
	Above Reservoir on sand bar	Alkalinity	2002	11/1/02
	Above Reservoir on sand bar	pH	2002	11/1/02
	Above Reservoir on sand bar	Specific Conductivity	2002	11/1/02
	Above Reservoir on sand bar	Ions	2002	11/1/02
	San Clemente Ck near Reservoir	Metals	2002	11/1/02
	San Clemente Ck near Reservoir	Alkalinity	2002	11/1/02
	San Clemente Ck near Reservoir	pH	2002	11/1/02
	San Clemente Ck near Reservoir	Specific Conductivity	2002	11/1/02
	San Clemente Ck near Reservoir	Ions	2002	11/1/02
	San Clemente Ck above Reservoir	Metals	2002	11/1/02
	San Clemente Ck above Reservoir	Alkalinity	2002	11/1/02
	San Clemente Ck above Reservoir	pH	2002	11/1/02
	San Clemente Ck above Reservoir	Specific Conductivity	2002	11/1/02
	San Clemente Ck above Reservoir	Ions	2002	11/1/02

Source: Monterey Peninsula Water Management District
ENTRIX 2002
ENTRIX 2003a
ENTRIX 2004a
ENTRIX 2005a
ENTRIX 2006

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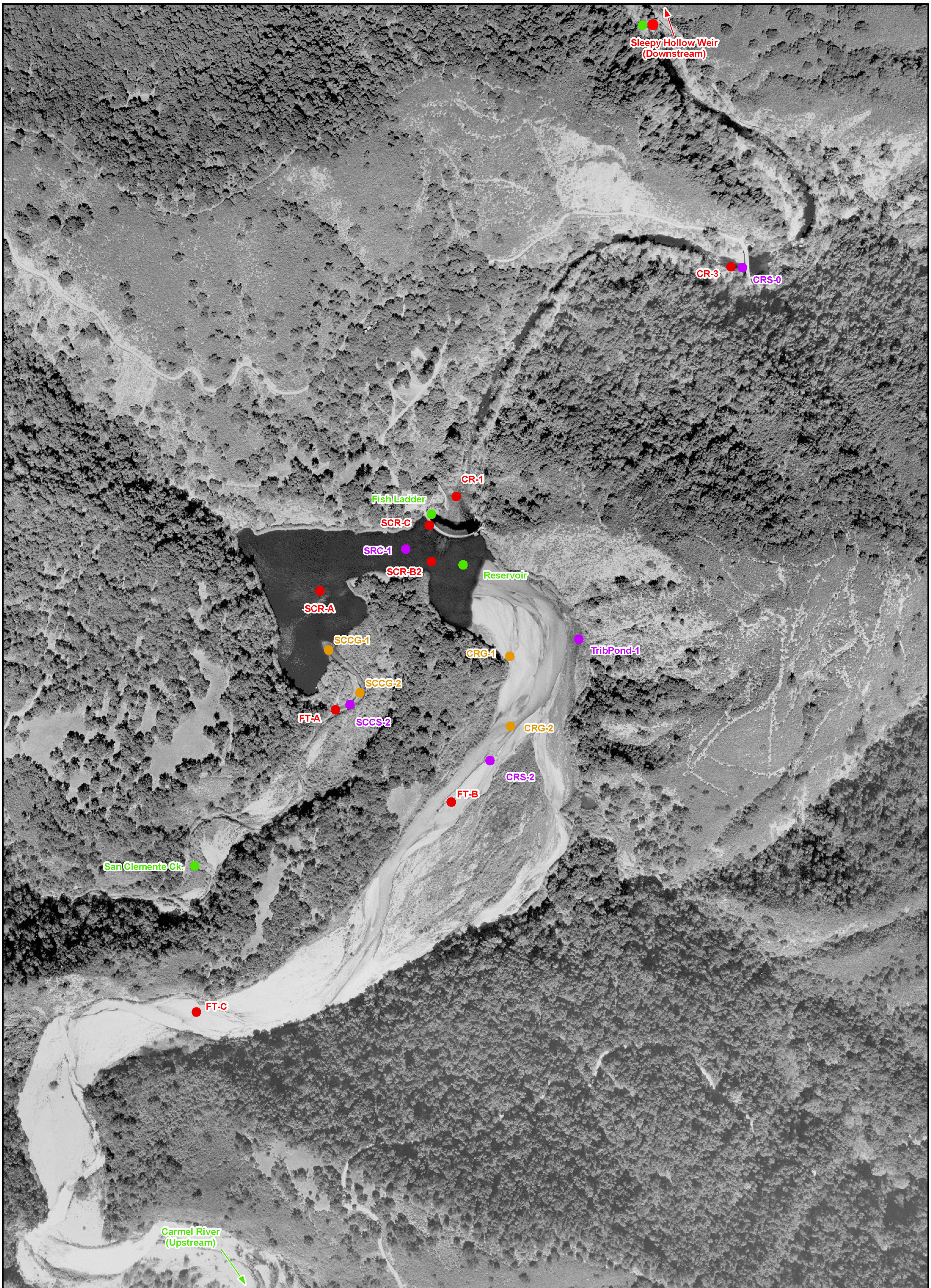

Monitoring Station Type

- CAW Drawdown Monitoring Stations
- MPWMD Surface Monitoring Stations
- Surface Stations (2002 Surface and porewater Study)
- Porewater Stations (2002 Surface and porewater Study)

ENTRIX

2005 San Clemente EIR/EIS
California American Water Co.

Figure 4.3-1

Water Quality
Monitoring Stations

0 100 200
Feet

9/6/05
Projection: CA State Plane, Zone 4
Datum: NAD 83

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During the 2003 to 2006 reservoir drawdowns, water quality data was collected from the reservoir and the Carmel River. The purpose of monitoring was to characterize water quality conditions for one week prior to drawdown, during drawdown, and one week post-drawdown. Conditions would vary seasonally and annually, depending on climate and rainfall. In 2003, baseline data (including dissolved oxygen [DO], turbidity, temperature, pH and conductivity) was collected for five days prior to drawdown. Monitoring continued throughout the drawdown operations and for about one week after the 515 feet reservoir elevation was reached. Water quality parameters were reduced during 2004 through 2006 because pH and conductivity did not provide any useful information to manage the drawdown. Turbidity, DO and temperature were collected in the reservoir in each year five days prior to the drawdown and were collected occasionally in the river downstream of the SCD.

Overall, pH measurements ranged from 7.1 to 8.1 throughout the monitoring period, thus demonstrating that pH was well within the established criteria of 5.8 to 9.0 (ENTRIX 2003b). Conductivity values ranged from 0.231 to 0.301 mS/cm, with a slight increasing trend observed during the monitoring period. The conductivity values observed are not uncommonly high or low (ENTRIX 2003a).

DO, turbidity and temperature were the water quality parameters of greatest concern in the reservoir and river during the summer drawdowns. A summary of the 2003 to 2006 DO, turbidity, and temperature data is provided below in Tables 4.3-2 to 4.3-4.

Table 4.3-2: Water Quality Summary at Station SCR-A during 2003-2006 Drawdowns

	2003	2004	2005	2006
DISSOLVED OXYGEN (mg/l)				
Baseline	6.3-8.3	7.8-9.0	2.8-8.5	6.0-8.4
Drawdown	2.4-8.0	3.5-9.4	2.4-8.4	1.7-8.8
Post-Drawdown	3.8-7.8	3.6-6.8	4.1-8.3	2.9-7.9
TURBIDITY (NTUs)				
Baseline	1.9-4.0	0.0-2.3	0.0-3.7	NA
Drawdown	1.7-35.7	0.0-15.8	0.0-7.5	5.7-14.0
Post-Drawdown	12.7-28.4	9.6-17.7	5.2-11.0	8.5-16.0
TEMPERATURE (°C)				
Baseline	16.3-17.5	16.1-18.2	18.4-22.7	18.1-20.2
Drawdown	16.2-24.9	16.2-22.2	19.4-24.1	17.9-26.6
Post-Drawdown	16.3-24.9	18.0-21.3	18.5-22.3	19.4-24.4

Table 4.3-3: Water Quality Summary at Station SCR-B during 2003-2006 Drawdowns

	2003	2004	2005	2006
DISSOLVED OXYGEN (mg/l)				
Baseline	7.2-7.9	8.2-8.8	4.8-8.2	6.6-8.2
Drawdown	4.7-8.0	3.0-9.8	4.3-10.8	3.1-8.5
Post-Drawdown	5.8-7.0	5.0-7.3	4.0-7.2	5.2-6.8
TURBIDITY (NTUs)				
Baseline	2.1-2.6	0.0-0.8	0.1-3.7	NA
Drawdown	2.3-25.9	0.0-16.8	0.0-6.6	5.6-11.4
Post-Drawdown	15.0-25.3	9.3-12.9	5.4-11.7	8.1-14.1
TEMPERATURE (°C)				
Baseline	16.5-17.9	16.2-18.2	18.4-21.6	18.1-20.4
Drawdown	16.2-21.8	16.1-20.0	19.2-23.6	17.8-25.3
Post-Drawdown	20.1-21.9	17.5-21.0	17.9-20.3	18.7-22.9

Table 4.3-4: Water Quality Summary at Station SCR-C during 2003-2006 Drawdowns

	2003	2004	2005	2006
DISSOLVED OXYGEN (mg/l)				
Baseline	6.8-8.5	7.1-8.3	5.6-8.4	5.4-7.8
Drawdown	4.4-8.0	4.8-8.7	5.0-8.4	2.7-7.8
Post-Drawdown	5.7-6.5	4.2-6.4	5.0-5.6	4.1-6.1
TURBIDITY (NTUs)				
Baseline	0-2	0-2	0-1	1-10
Drawdown	0-38	0-14	0-18	2-19
Post-Drawdown	13-38	8-19	5-16	16-39
TEMPERATURE (°C)				
Baseline	16.2-17.4	15.6-16.8	18.5-20.0	17.9-19.1
Drawdown	16.1-21.0	15.4-19.8	18.8-21.7	17.5-24.7
Post-Drawdown	20.1-22.0	18.1-20.8	18.2-20.6	18.8-22.9

In the Carmel River, dissolved oxygen concentrations ranged from approximately 8.0 mg/L to 10.0 mg/L. (Figure 4.3-2). Turbidity was very low, ranging from 0 to 3.5 Nephelometric Turbidity Units (NTUs). Water temperatures ranged from 13 ºC to 18 ºC in the morning and 17 ºC to 22 ºC in the afternoon.

In San Clemente Creek, dissolved oxygen concentrations ranged from 7.0 mg/L to 10.0 mg/L (Figure 4.3-3). Generally, turbidity was low, averaging 0 to 3 NTUs, with two brief spikes of 4.3 and 8.7 NTUs. Water temperatures ranged from 11 ºC to 16 ºC in the morning and 14 °C to 18 ºC in the afternoon.

The MPWMD has recorded instream water temperature in the Carmel River since water year (WY) 1997 and in San Clemente Creek during summer and fall of 2003 (MPWMD 2004). The MPWMD deploys continuous monitoring probes in April or May, depending on runoff conditions, and retrieves the probes in November. Average temperatures recorded for the Carmel River were about 14 ºC in April, with a diurnal variation of 4 ºC to 6 ºC). Daily temperatures increased until early August, when average temperatures were about 21 ºC and maximum temperature was about 25 ºC. Temperatures then begin decreasing until November when the minimum temperature reaches about 10 ºC.

The period of record for water temperature in San Clemente Creek is too short to determine general patterns and temperature ranges. Appendix Q shows the data collected on San Clemente Creek from May 28 to September 30, 2003. During this period the daily average water temperature ranged from 14 °C to 18 ºC, with a diurnal variation of 4 ºC to 6 ºC.

A characterization of surface and pore water chemistry in the Carmel River and San Clemente Creek) was conducted by ENTRIX in 2002 to evaluate potential water quality effects associated with water level drawdown in San Clemente Reservoir. Sampling locations are shown in Figure 4.3-1. Chemical analyses included metals, hardness, total dissolved solids, pH, specific conductivity, and ionic chemistry.

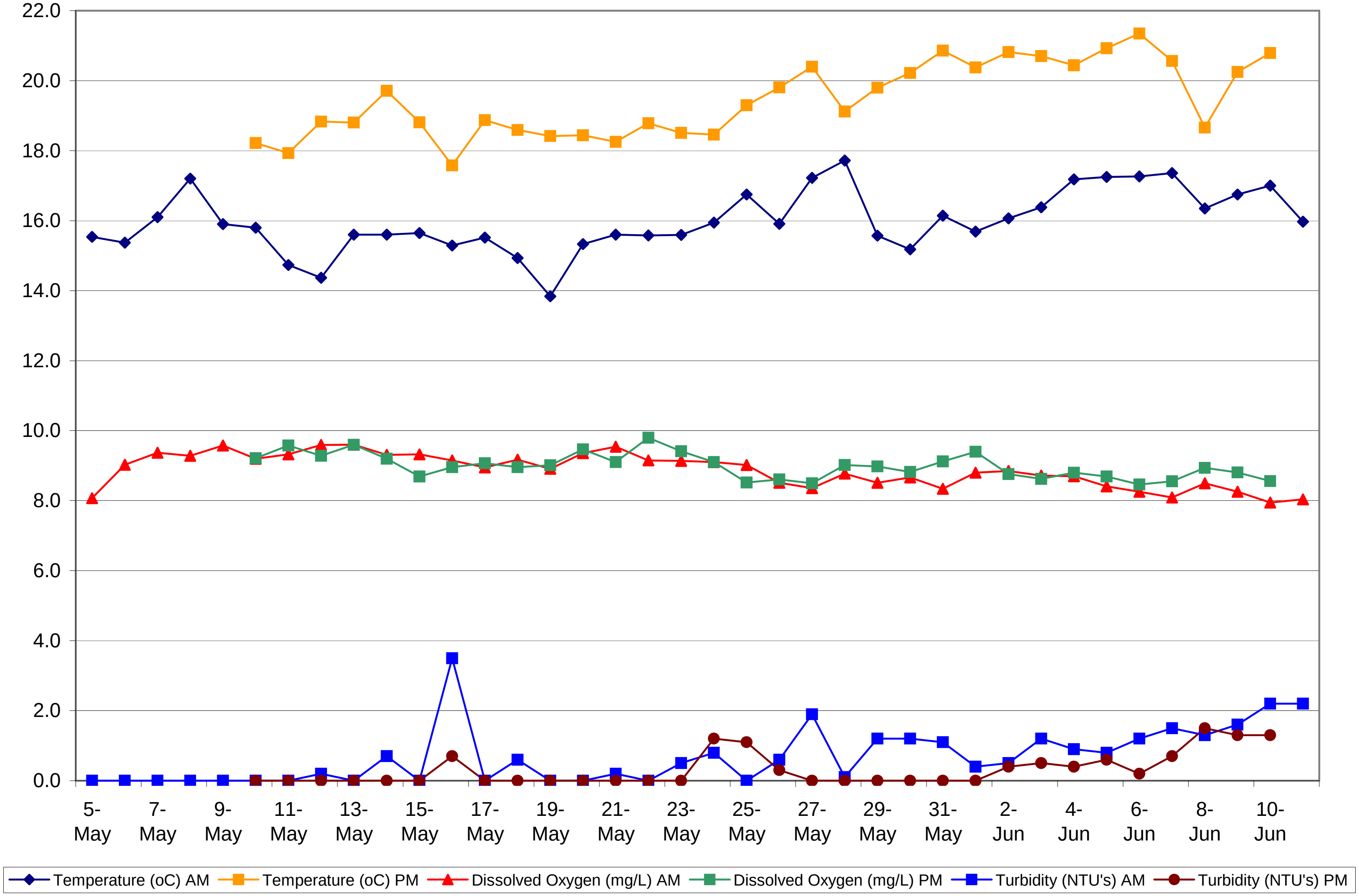
The majority of results for metals were non-detected at the laboratory's reporting limits. All detected metals results were well below the established water quality criteria for both aquatic life and human health protection. The hardness results (96 to150 mg/L) indicate a good buffering capacity against changes in both pH and metals concentrations.

The results of the ionic chemistry analyses were below established water quality criteria for surface waters, with the exception of sodium (Na) concentrations (20 mg/L maximum from Central Coast Basin Plan) in San Clemente Creek (25 mg/L), and the tributary pond (99 mg/L). Most porewater analysis results were also below the criteria, except for iron (1.0 mg/L, EPA), which ranged from 4.4 mg/L to 12 mg/L.

San Clemente Reservoir

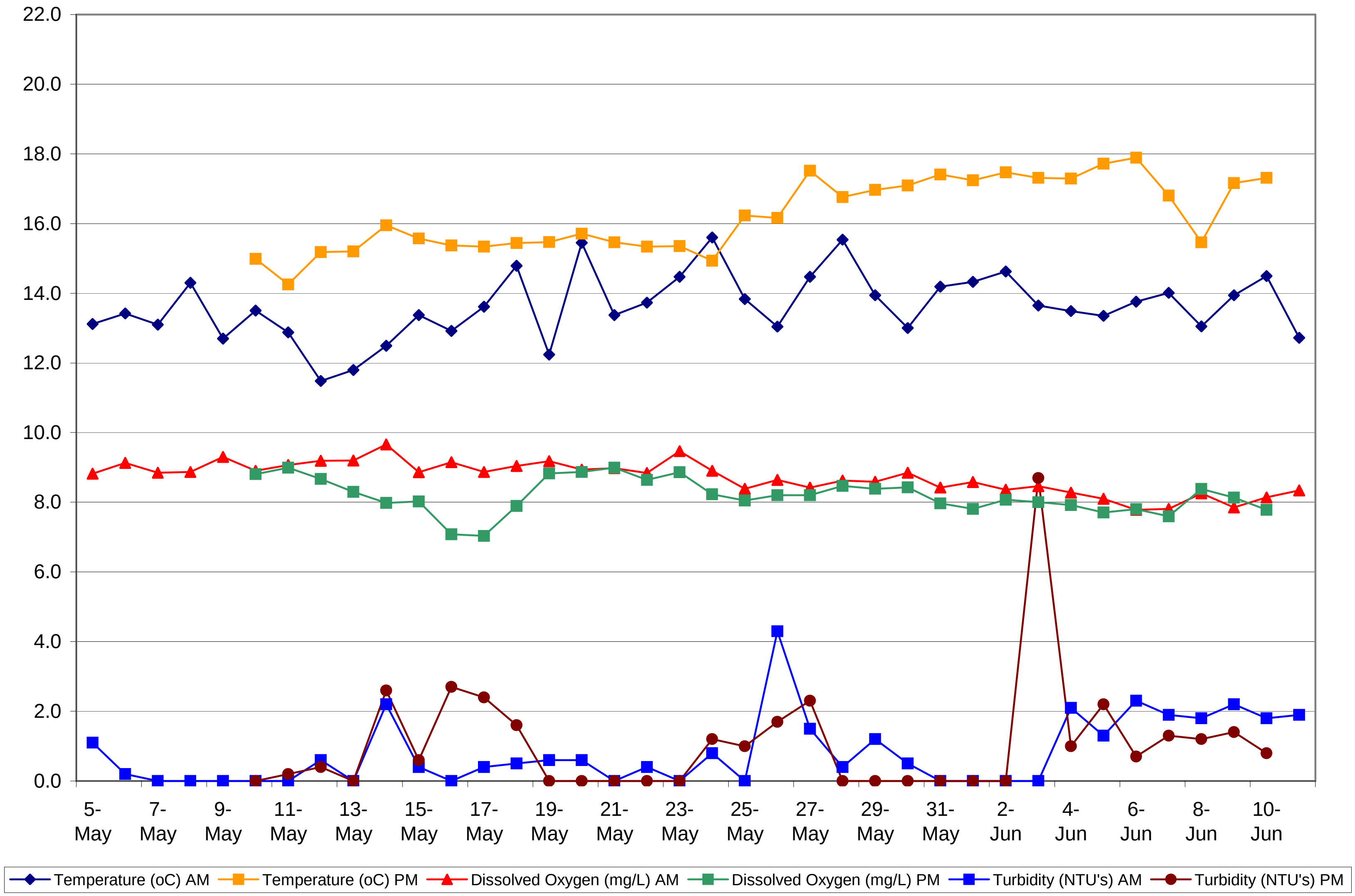
Three sources of water quality data are available for San Clemente Reservoir, which are derived from both long-term and short-term monitoring programs (Table 4.3-1). Fixed station measurements of dissolved oxygen, turbidity, temperature, pH and specific conductivity were monitored during the 2003 drawdown. During the 2004 through 2006 drawdowns, dissolved oxygen, turbidity and temperature were monitored. Additional reservoir monitoring during the 2003 drawdown included hydrogen sulfide. The MPWMD has also monitored reservoir surface water temperatures from 1997 through 2003 and bottom water temperatures from 1998 through 2003. A water chemistry analysis of reservoir water was performed by ENTRIX in 2002 to establish baseline conditions.

Figure 4.3-2: 2004 Carmel River Water Quality above San Clemente Reservoir



Source: ENTRIX 2004a

Figure 4.3-3: 2004 San Clemente Creek Water Quality above San Clemente Reservoir



Source: ENTRIX 2004a

A summary of the water quality information from these sources relevant to potential project activities and actions is presented below.

DISSOLVED OXYGEN

Diurnal dissolved oxygen concentrations were available for San Clemente Reservoir during the 2003 drawdown (June 23 to July 26) (Figure 4.3-4) (See also Appendix Q-4). Daily minimum and maximum dissolved oxygen concentrations were available for the 2004 drawdown (May 10 to June 3), the 2005 drawdown (July 25 to August 15) (Appendix Q, Figures 4.3-5 and 4.3-6), and the 2006 drawdown (July 3 to July 27) (Figure 4.3-7). Note that the drawdown rate during 2004 to 2006 was much slower (about 0.5 ft/day) than during the first part of the 2003 drawdown (about 2 ft/day). This would be one of the main factors that accounts for the difference between water quality conditions during 2003 compared to the other drawdown events.

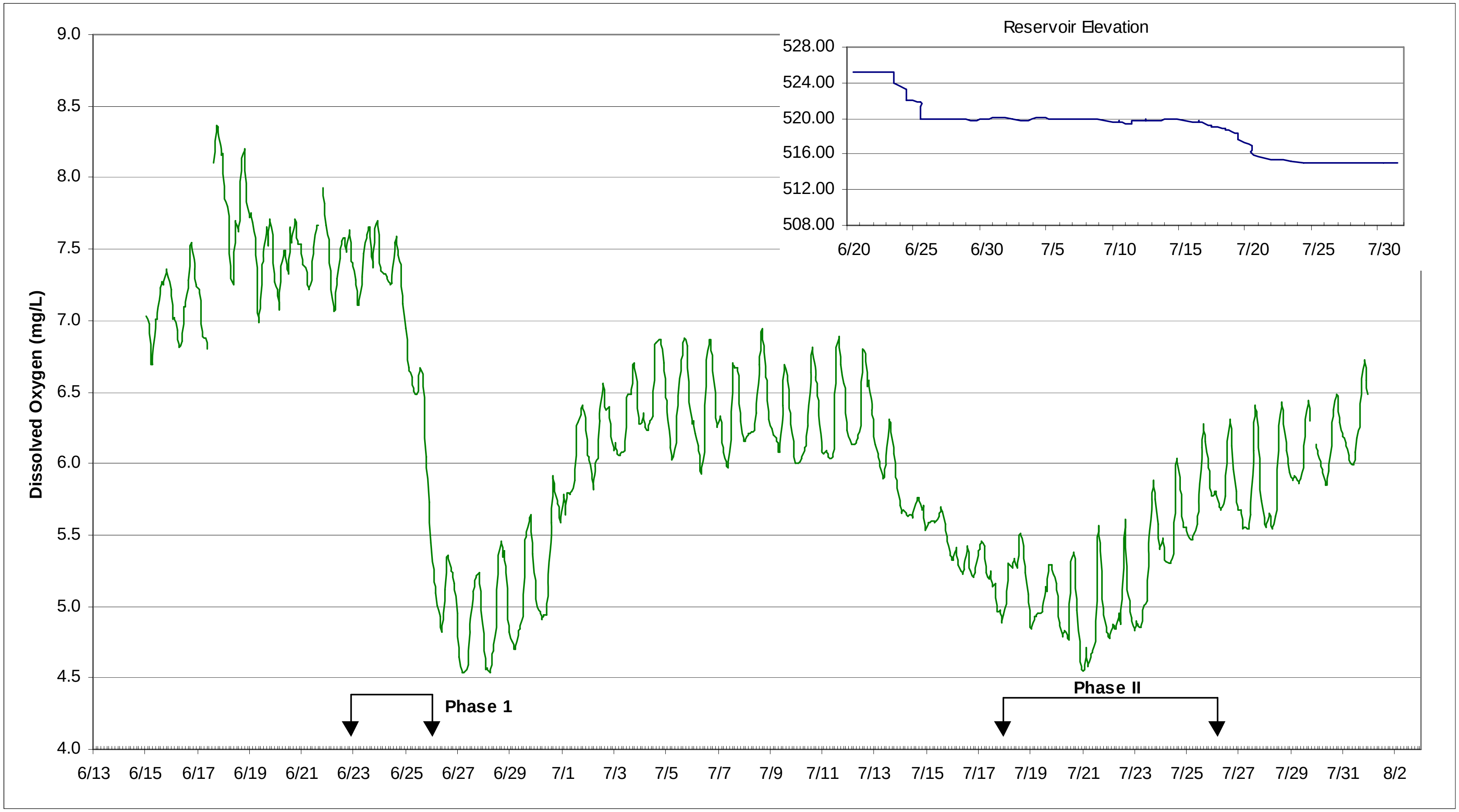
During the six days prior to the 2003 drawdown (baseline condition) dissolved oxygen concentration ranged from 6.6 mg/L to 8.4 mg/L and averaged 7.1 mg/L. During the periods when drawdown occurred, dissolved oxygen values ranged from 4.5 mg/L to 6.3 mg/L and averaged about 5.3 mg/L). Following the drawdown, dissolved oxygen partially recovered over a 3-5 day period with values ranging from 5.5 mg/L to 7.0 mg/L and averaging 6.3 mg/L.

During the five days prior to the 2004 drawdown (baseline condition) dissolved oxygen values ranged from 7.0 mg/L to 8.3 mg/L and averaged 7.6 mg/L. During the drawdown, dissolved oxygen values ranged from 4.8 mg/L to 8.7 mg/L and averaged 6.5 mg/L. For seven days following the drawdown, dissolved oxygen continued to decline for the first 2 days and then appeared to start increasing, with values ranging from 4.5 mg/L to 6.5 mg/L and averaging about 5.2 mg/L.

During the week prior to the 2005 drawdown (baseline condition) dissolved oxygen values ranged from 5.6 mg/L to 8.4 mg/L and averaged 7.0 mg/L. During the drawdown, DO values ranged from 5.0 mg/L to 7.9 mg/L and averaged 6.0 mg/L. Similar values were observed for about two weeks following the drawdown. Dissolved oxygen concentrations then began to increase with values averaging 7.5 mg/L by mid-September.

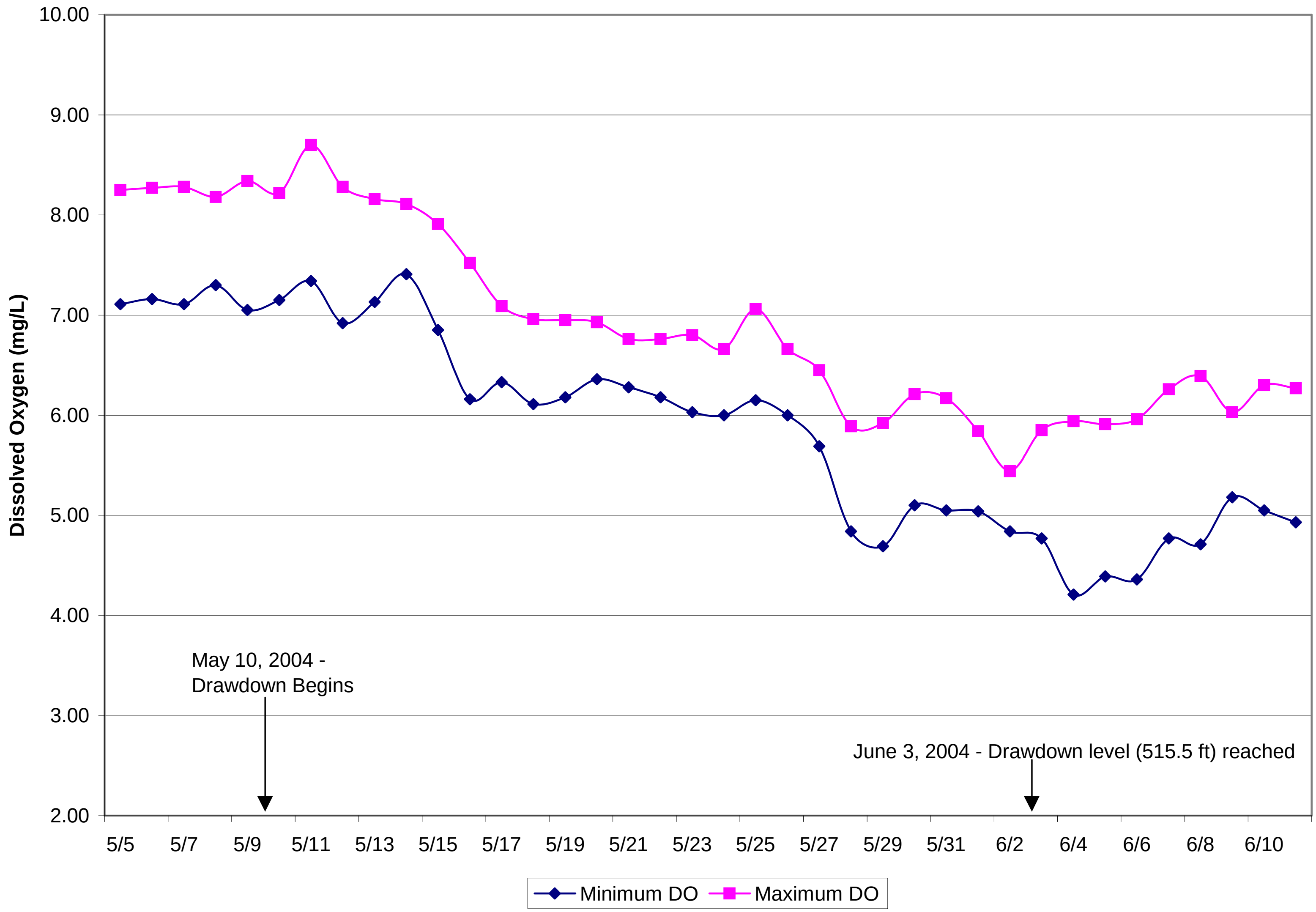
In 2006, DO concentrations were higher prior to the drawdown with a decreasing trend following the start of the drawdown and then increasing towards the end of the drawdown operations (Figure 4.3-7). Throughout the drawdown period (July 3 to August 8), morning concentrations ranged from 3.3 to 8.4 mg/L at the surface and 4.6 to 9.3 mg/L at the 10-foot depth. Afternoon concentrations ranged from 4.0 to 8.8 mg/L at the surface and 2.6 to 7.9 mg/L at the 10-foot depth. Supersaturated DO concentrations (values > 8.6 mg/L) were recorded at the surface in the afternoon (July 3 and July 6). These supersaturated concentrations are attributed to the photosynthetic activity of algae in the late afternoon.

Figure 4.3-4: 2003 Reservoir Dissolved Oxygen Concentration during Drawdown



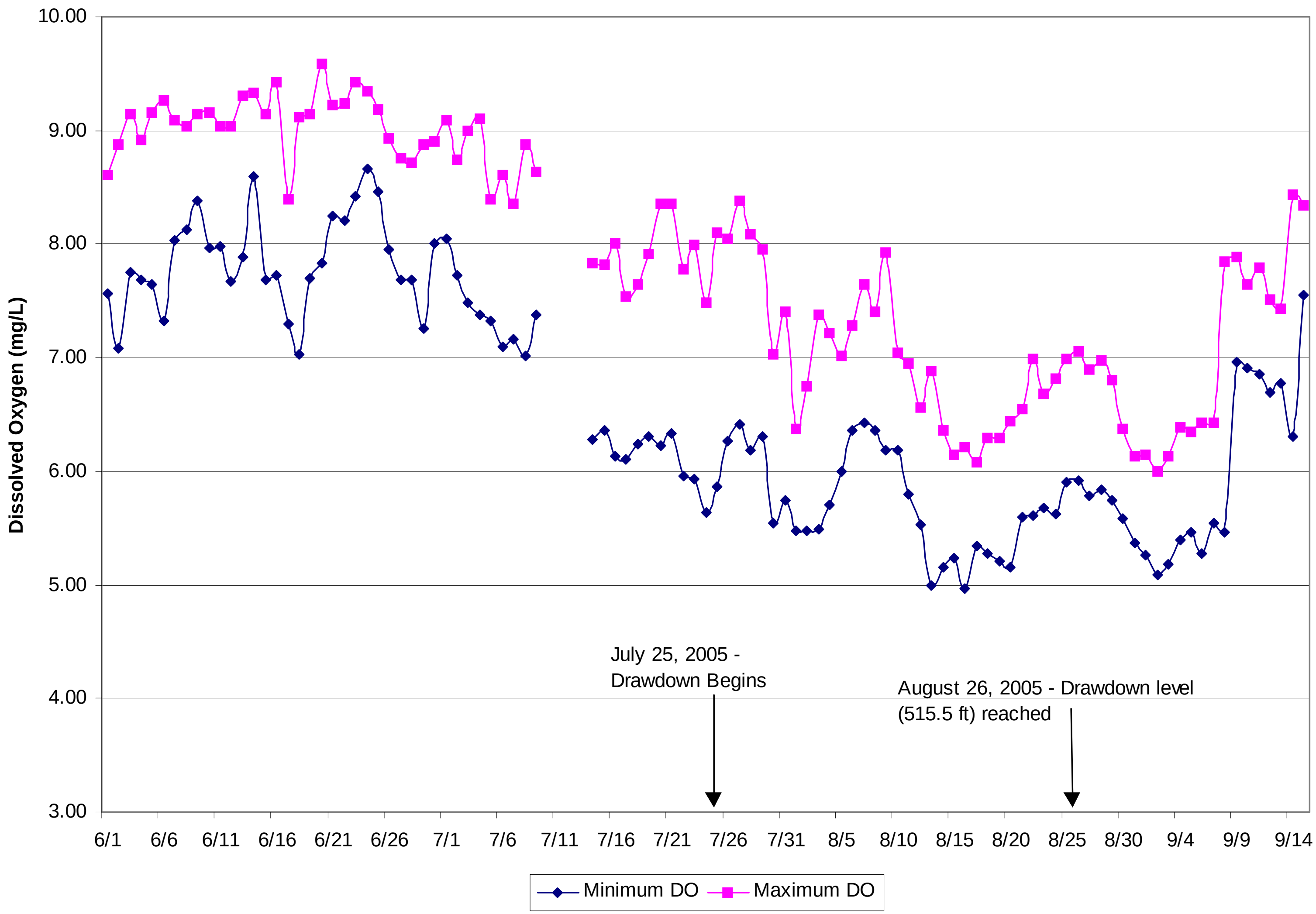
Source: Entrix 2003a

Figure 4.3-5: 2004 Reservoir Dissolved Oxygen Concentration during Drawdown



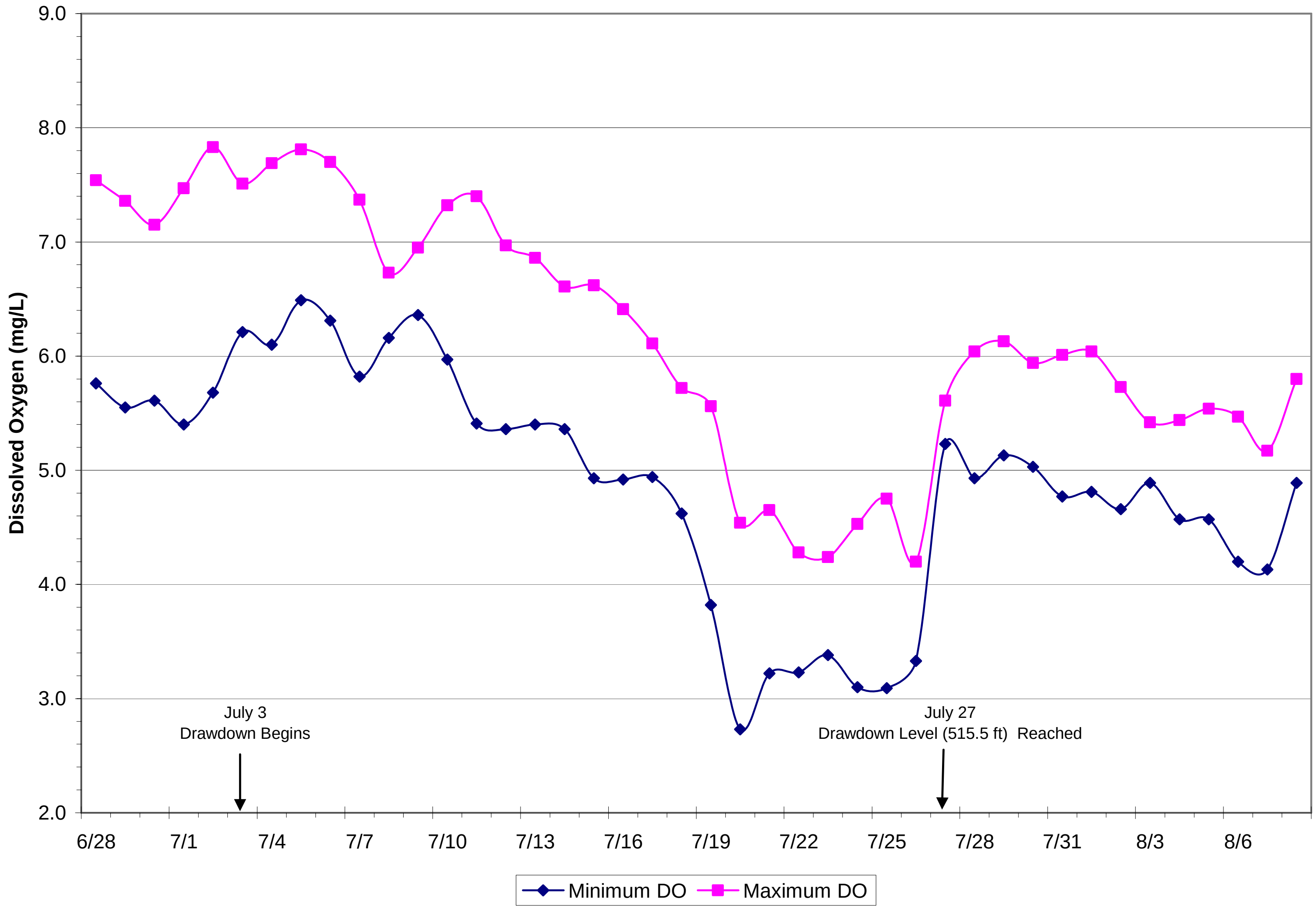
Source: ENTRIX 2004a

Figure 4.3-6: 2005 Reservoir Dissolved Oxygen during Drawdown



Source: Entrix 2005a

Figure 4.3-7: 2006 Reservoir Dissolved Oxygen during Drawdown



Source: Entrix 2006

TURBIDITY

Diurnal turbidity was available for the 2003 drawdown and daily minimum and maximum values were available for the 2004 through 2006 drawdowns (Appendix Q). For six days prior to the 2003 drawdown (baseline condition), turbidity ranged from 0 to 1 NTUs. During the drawdown, turbidity rapidly increased, with a range of 8 to 34 NTUs. For six days following the drawdown, turbidity ranged from 14 to 19 NTUs and appeared to be gradually decreasing (Figure 4.3-8). Monitoring conducted beyond the 2003 drawdown during winter 2003/2004 showed that turbidity gradually declined after the drawdown period and reached a range of 0 to 1 NTUs in the second week of January 2004. Note that turbidity levels during 2003 were much higher than during 2004 or 2005. Turbidity remained around 0 to 1 NTUs during winter, except for very brief periods (two to four days) following large rainstorms. During storm runoff events turbidity was observed to increase and decrease very abruptly. During the winter 2003/2004 monitoring period there were five storm-related turbidity peaks ranging from 68 NTUs to 578 NTUs that were associated with flows ranging from 462 cfs to 2,060 cfs. Between storm events turbidity was generally less than 1 NTU.

For five days prior to the 2004 drawdown (baseline condition), turbidity in the reservoir was 0 NTU, except for one very brief spike of 2 NTUs. Turbidity generally increased during the drawdown period, with a range of 0 to 14 NTUs (Figure 4.3-9). For seven days following the drawdown, turbidity continued to increase, with values ranging from 8 to 19 NTUs.

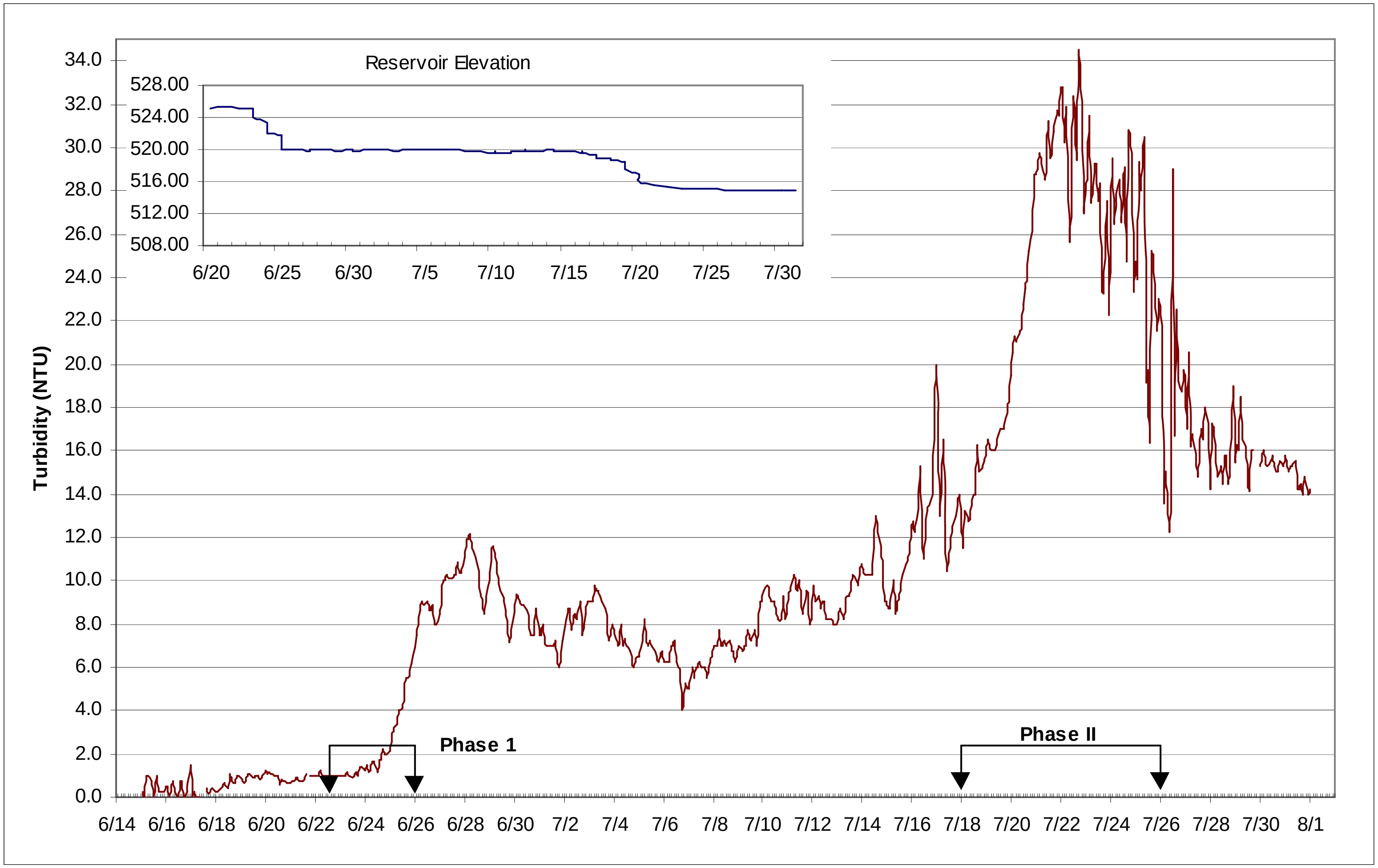
During the week prior to the 2005 drawdown, turbidity in the reservoir was 0 NTU. Turbidity quickly increased during the drawdown period, with a range of 1 to 19 NTUs (Figure 4.3-10). Following the drawdown, turbidity varied widely between 4 to 18 NTUs and did not show any overall trends.

In 2006 there was a gradual increase in turbidity as the drawdown progressed (1 to 19 NTUs) (Figure 4.3-11), followed by a large spike (18 NTUs) two weeks prior to reaching the target elevation of 515.5 feet. Turbidity values one week prior to the drawdown (June 28 to July 3) were the lowest. Turbidity values at SCR-C were higher towards the conclusion of the drawdown due to organic debris building up in this section of the reservoir (no inflow influence from Carmel River); therefore, turbidity values were much higher (> 20 NTUs) than the 2005 drawdown event.

TEMPERATURE

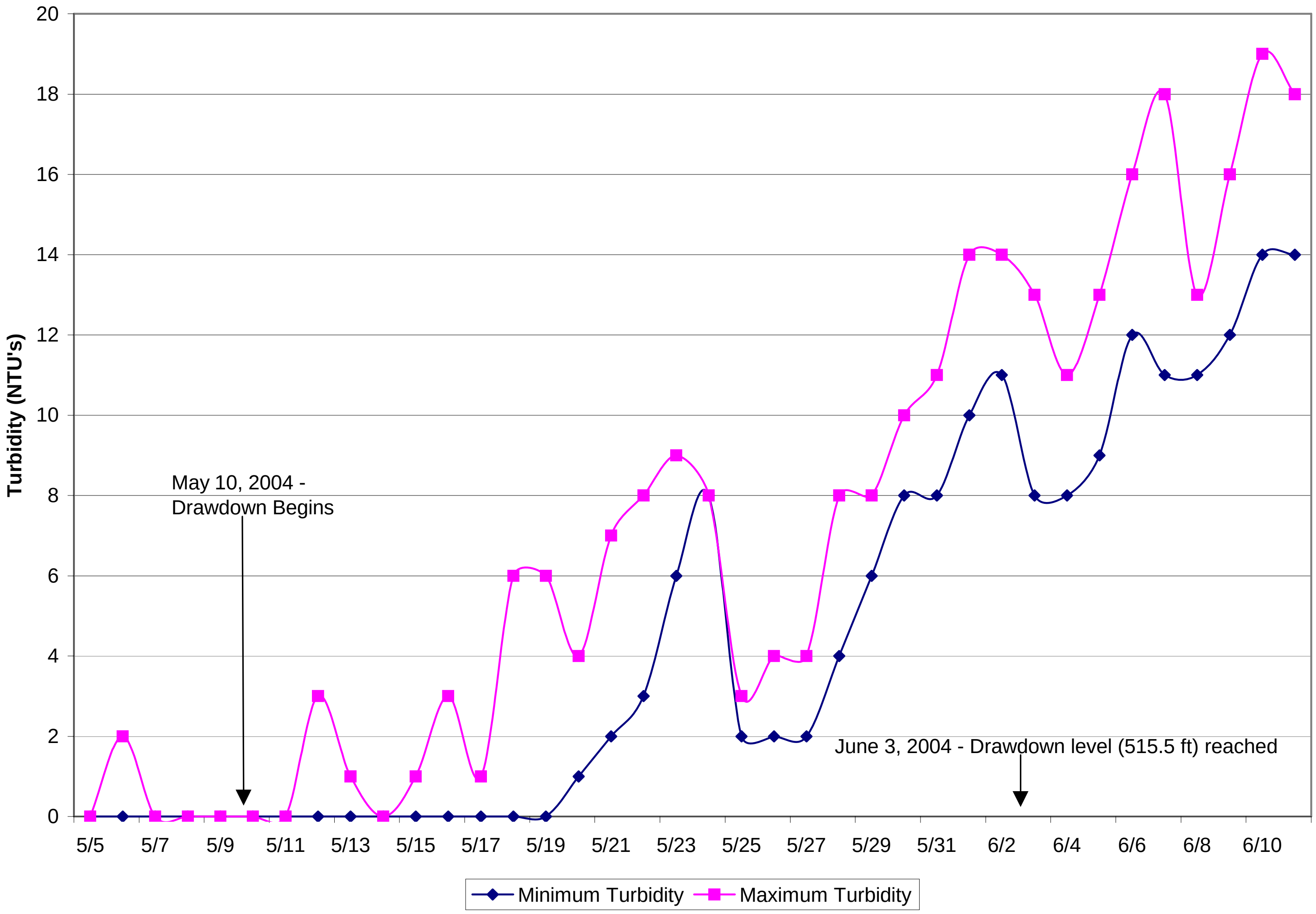
Water temperatures in San Clemente Reservoir were available for the 2003, 2004, 2005, and 2006 drawdowns as well as from the MPWMD’s long-term data set and are summarized below (Figures 4.3-12 to 4.3-15) and in Appendix Q.

Figure 4.3-8: 2003 Reservoir Turbidity during Drawdown



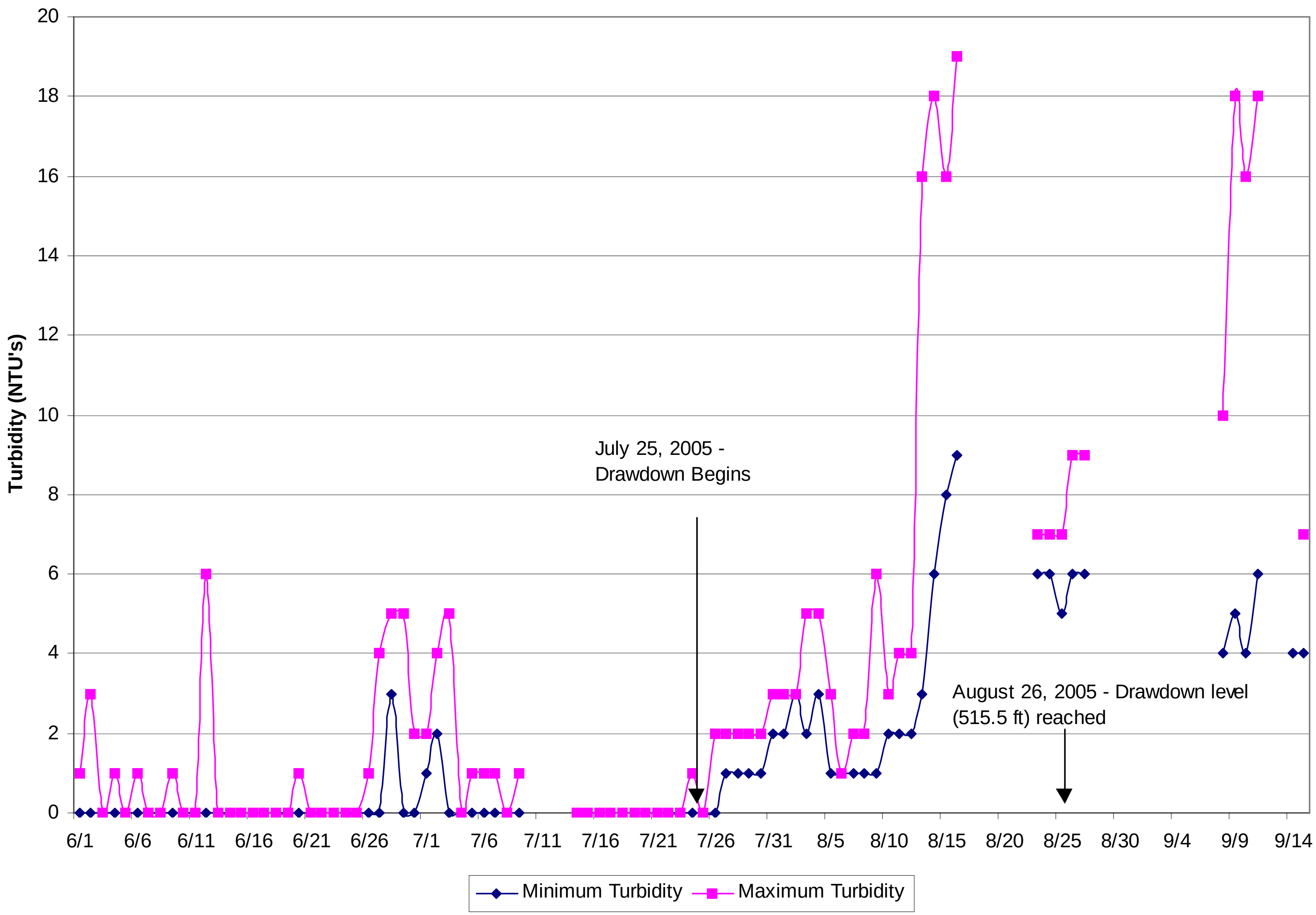
Source: Entrix 2003a

Figure 4.3-9: 2004 Reservoir Turbidity during Drawdown



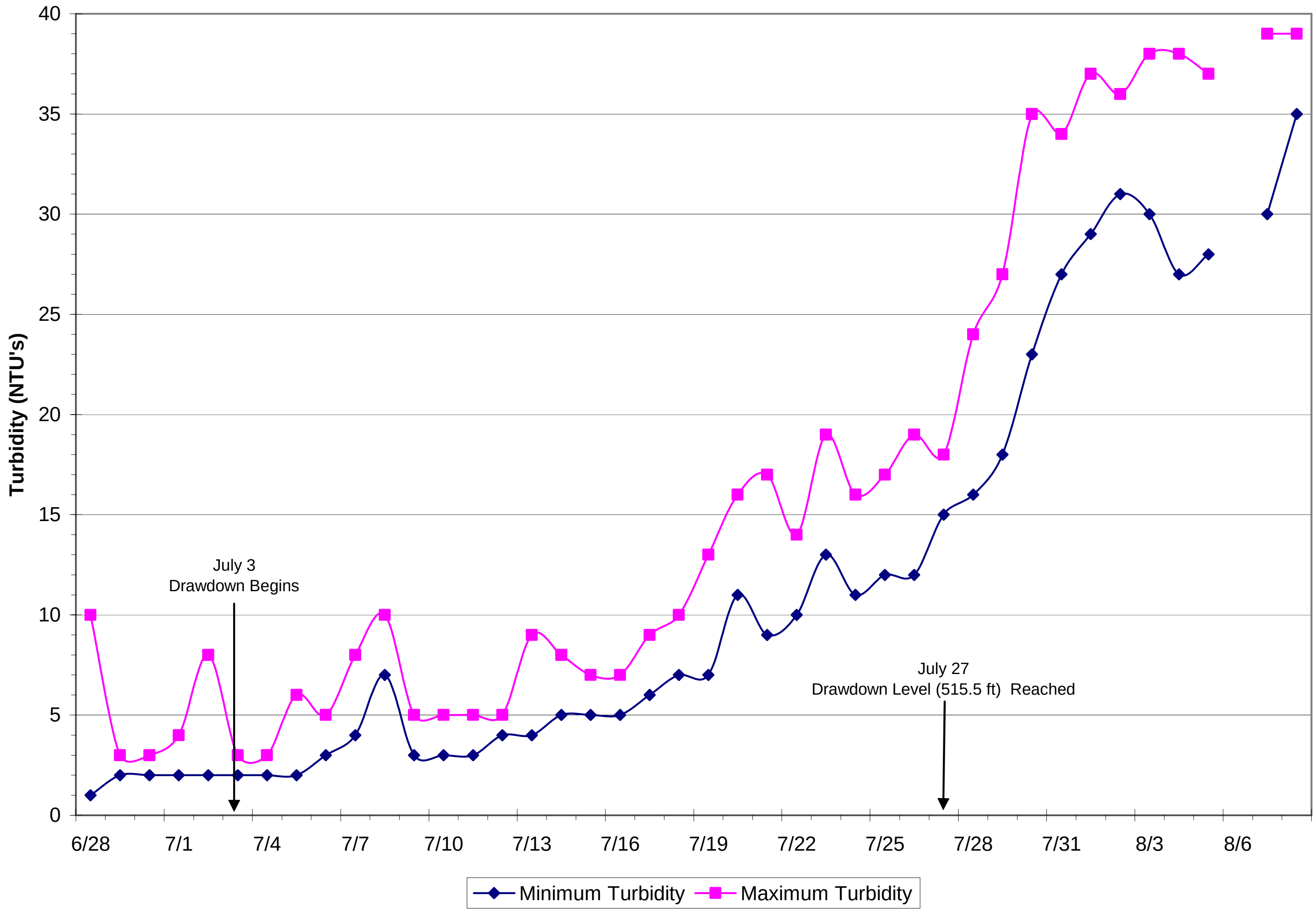
Source: ENTRIX 2004a

Figure 4.3-10: 2005 Reservoir Turbidity during Drawdown



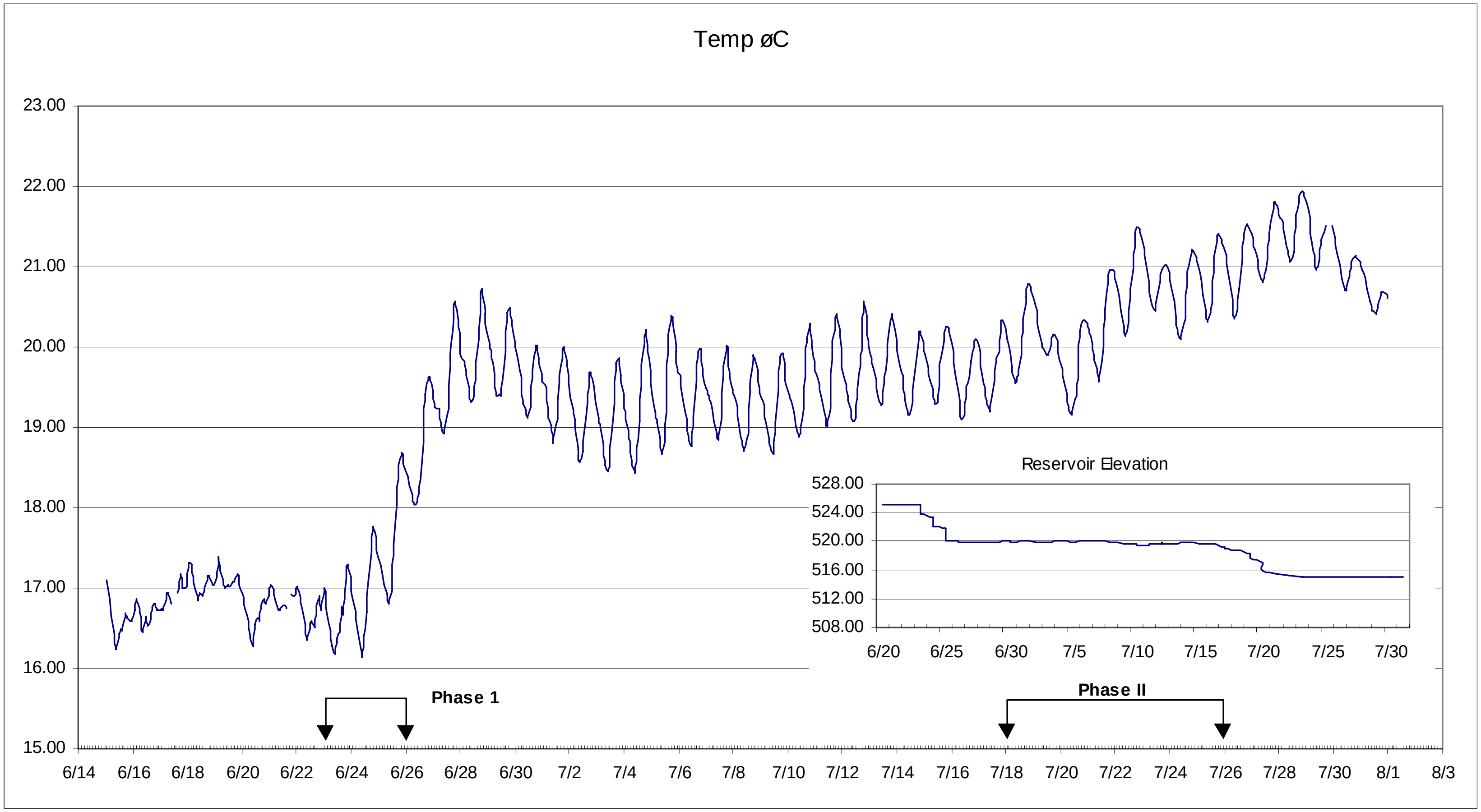
Source: Entrix 2005a

Figure 4.3-11: 2006 Reservoir Turbidity during Drawdown



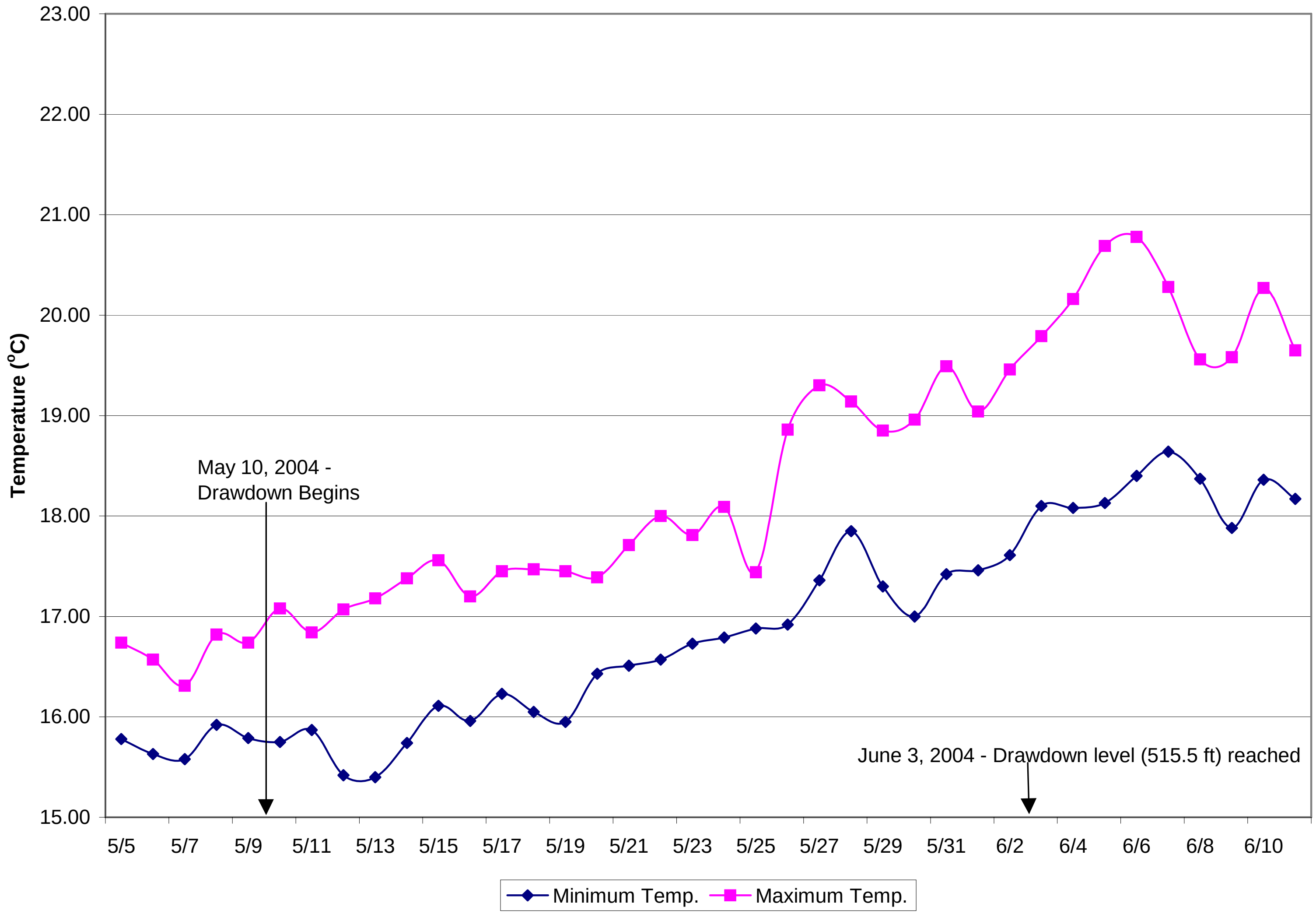
Source: Entrix 2006

Figure 4.3-12: 2003 Reservoir Temperature during Drawdown



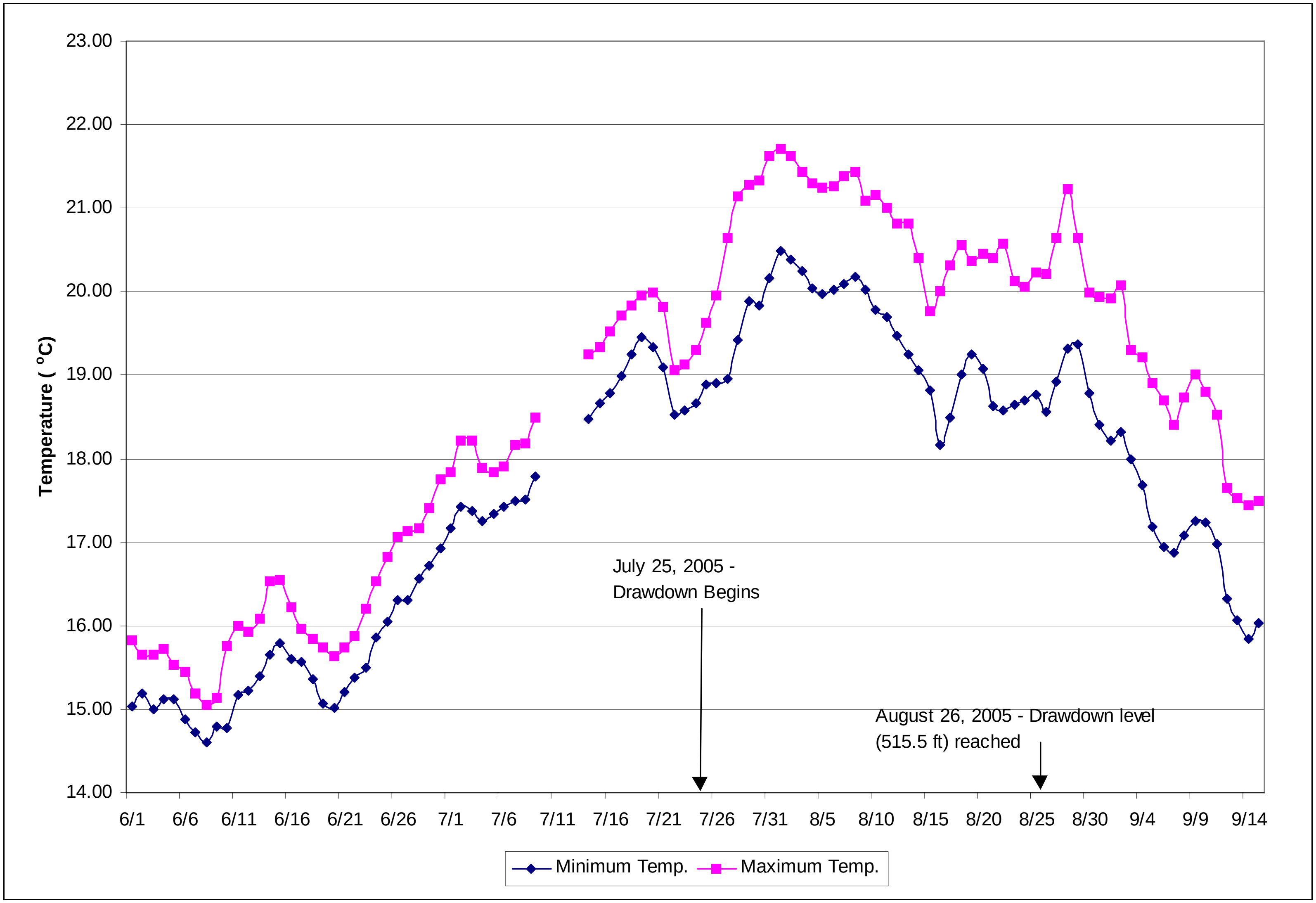
Source: Entrix 2003b

Figure 4.3-13: 2004 Reservoir Temperature during Drawdown



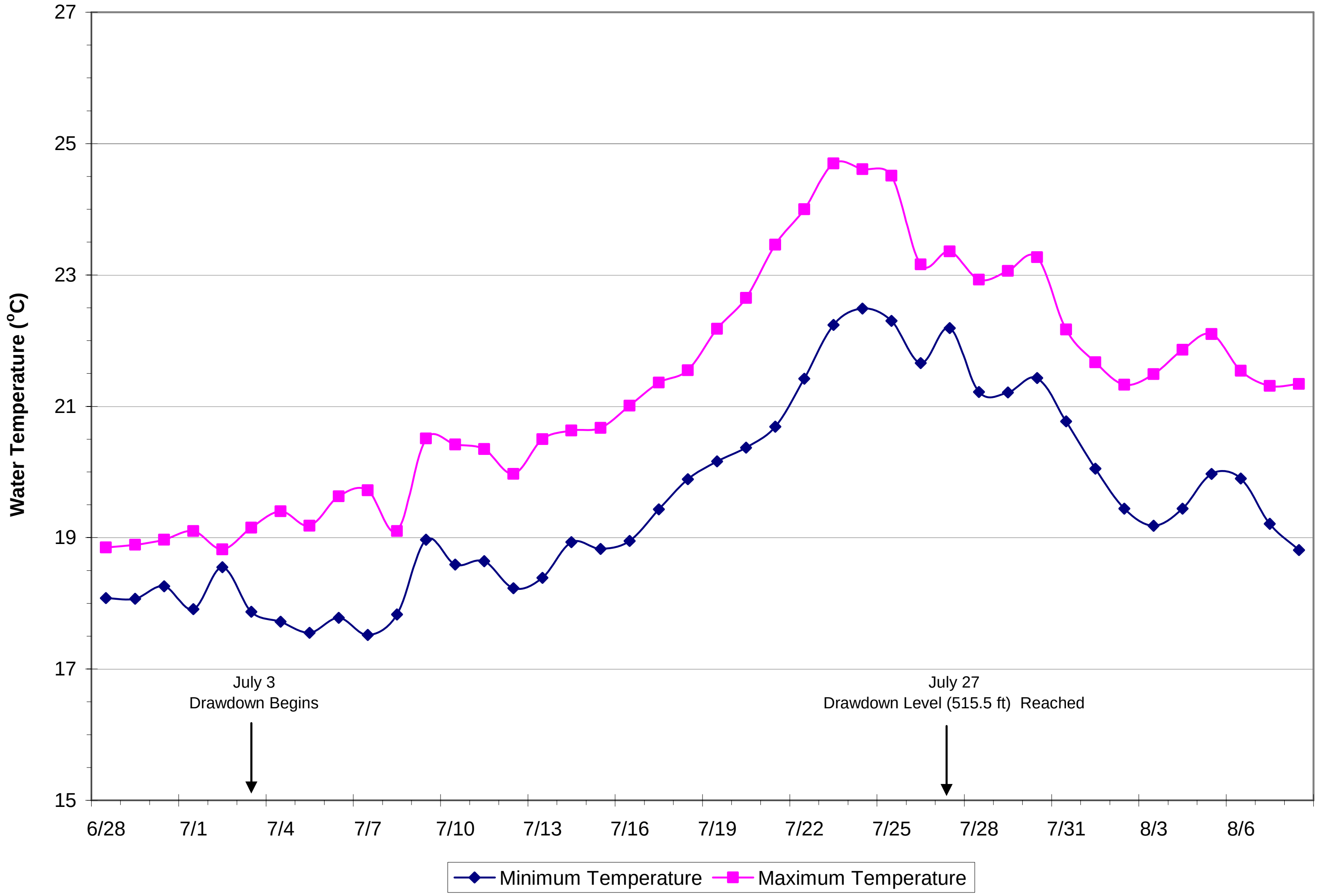
Source: ENTRIX 2004a

Figure 4.3-14: 2005 Reservoir Temperature during Drawdown



Source: Entrix 2005a

Figure 4.3-15: 2006 Reservoir Temperature during Drawdown



Source: Entrix 2006

During the six days prior to the 2003 drawdown, water temperatures ranged from 16.3 ºC to 17.4 ºC. Water temperatures increased rapidly during the two days immediately following the first phase of the drawdown, coinciding with sharp increases in ambient air temperature, with a range of 18.5 ºC to 20.7 ºC (Figure 4.3-12). Water temperature continued to increase during and after the second phase of the drawdown, with values ranging from 19.2 ºC to 22.0 ºC.

During the five days prior to the 2004 drawdown, water temperatures ranged from 15.5 ºC to 16.8 ºC. Water temperatures gradually increased during and after the drawdown period, with values ranging from 15.5 ºC to 20.8 ºC (Figure 4.3-13). It is likely that differences between the 2003 and 2004 water temperatures are largely due to differences in ambient air temperatures.

During the week prior to the 2005 drawdown, water temperatures in the reservoir ranged from 18.5 ºC to 20 ºC. Figure 4.3-14 shows that reservoir temperatures appear to reflect a naturally increasing trend during summer. During the drawdown, water temperatures increased to a maximum of about 21.5 ºC, and then began to gradually decrease, with minimum temperatures reaching 16 ºC by mid September.

The temperature trend observed during the 2006 drawdown indicated a gradual increase in temperature followed by a gradual decrease for the last two weeks of the monitoring period. Prior to the drawdown, temperature ranged from 17.9 °C to 20.4°C. During the drawdown process (including prior to the drawdown commencing) temperatures gradually increased and then began to decrease, with minimum temperatures ranging from 17.5 °C to 22.5°C and maximum temperatures ranging from 19.1 °C to 26.6°C (Figure 4.3-15).

Since WY 1997, the MPWMD has recorded surface water temperature in San Clemente Reservoir during spring, summer, and fall (MPWMD 2004). A continuous recording temperature probe is deployed starting in April or May (depending on runoff conditions) and retrieved in about mid to late November in most years. Minimum, maximum and average water temperatures are graphed by water year for the recorded data set. A consistent seasonal pattern of increasing and decreasing water temperature occurs in the reservoir (Appendix Q). From spring (April to May) through summer (early August), surface water temperature steadily increases from about 13 ºC to 22 ºC. A relatively gradual decrease in surface water temperature to about 18 ºC in August and September is followed by a more rapid decrease to about 10 ºC by late November/early December.

Since WY 1998, the MPWMD has also recorded bottom water temperature in the San Clemente Reservoir during spring, summer and fall. A continuous recording temperature probe is deployed on the bottom on the same schedule as the surface probe. The same seasonal pattern of increasing and decreasing water temperatures observed at the reservoir surface also occurs at the bottom. However, there is generally less daily variation in temperature and maximum values are slightly lower. From spring (April to May) through summer (early August) bottom water temperature steadily increases from about 11 ºC to 20 ºC. A gradual decrease to about 17 ºC occurs in August, followed by a rapid decrease to about 10 ºC in late November.

HYDROGEN SULFIDE

The potential occurrence of hydrogen sulfide accumulation in the reservoir was a concern for the 2003 drawdown of the San Clemente Reservoir. Prior chemical analysis of porewater from the Carmel River and San Clemente Creek stream channels indicated the presence of sulfate. Sulfate is reduced to hydrogen sulfide under anaerobic conditions such as occur in the porewater. Under drawdown conditions, porewater from the streambeds is released into the reservoir as the water level is lowered.

During the 2003 drawdown, hydrogen sulfide tests were conducted at several stations within the reservoir to determine if hydrogen sulfide levels would pose a risk to fish survival in the reservoir. Hydrogen sulfide tests on water samples collected from the middle water column at stations about 50 to 200 feet from the two stream mouths did not detect any hydrogen sulfide (ENTRIX 2003b). Hydrogen sulfide was detected in about 21 percent of samples collected from stations located on each side of the Carmel River and San Clemente Creek and from the bottom of the water column near the sediment fronts. The hydrogen sulfide concentrations were barely detectable, ranging from <0.1 to 0.2 mg/L, well below the project threshold of 0.5 mg/L.

OTHER PARAMETERS

Specific conductance and pH were monitored and reported during the 2003 drawdown period (ENTRIX 2003b). Specific conductance values ranged from 0.231 to 0.301 mS/cm, with a fairly constant, but minor increase during the monitoring period. The pH levels ranged from 7.1 to 8.1 throughout the monitoring period, well within the aquatic life criterion of 5.8 to 9.0. An evaluation of the drawdown results indicated that the response of specific conductance and pH during the drawdown was negligible and consequently it was decided that they would not be reported during the 2004 drawdown. No further evaluation of specific conductance or pH is made in this report.

2002 WATER CHEMISTRY ANALYSIS

A surface water sample was collected by ENTRIX from San Clemente Reservoir in 2002 and analyzed by a certified laboratory for metals, alkalinity, hardness, total dissolved solids, and general ionic chemistry, Except for barium, all metals results were below laboratory detection limits. The barium concentration (41 ug/L) was well below all maximum criteria for the protection of aquatic and human health. All other measured parameters were well within normal concentrations. (Appendix Q).

Fish Ladder

Since WY 1997, the MPWMD has recorded water temperature in the San Clemente Fish Ladder (MPWMD 2004). A continuous recording temperature probe is deployed starting in early to mid-November and retrieved in early June in most years. Minimum, maximum and average water temperatures are graphed by water year for the recorded data set (Appendix Q). Average water temperature is about 12 ºC to 17 ºC in November, decreases to about 7 ºC to 13 ºC for the period of December through March and then steadily increases to about 20 ºC in June. Diurnal variation was 0 ºC to 3 ºC throughout the monitoring period.

Carmel River below San Clemente Reservoir

Water quality information is available for the Carmel River at three locations below San Clemente Reservoir. These locations are at the first riffle below the plunge pool, the Old Carmel River Dam (OCRD) Bridge, and the Sleepy Hollow Weir. The water quality information available from each location is summarized below. Water temperature measurements are summarized in Appendix Q.

FIRST RIFFLE BELOW THE PLUNGE POOL

Water quality measurements were taken in the first riffle below the plunge pool at the base of San Clemente Dam during the 2003 and 2004 drawdown events. Measured parameters included dissolved oxygen, turbidity, temperature, and hydrogen sulfide (2003 only).

Daily average dissolved oxygen concentrations recorded during 2003 and 2004 are based on measurements taken once in the morning and again in the late afternoon. Average dissolved oxygen values ranged from 8.5 mg/L to 9.4 mg/L in 2003 and from 8.5 mg/L to 9.6 mg/L in 2004. Average turbidity ranged from 1.3 to 26.2 NTU in 2003 and 0.5 to 12.3 NTU in 2004. Water temperature ranged from 16.0 ºC to 21.0 ºC in 2003 and from 15.7 ºC to 18.9 ºC in 2004.

Hydrogen sulfide measurements were taken daily during the 2003 drawdown. No hydrogen sulfide was detected in any of the test results.

THE OCRD BRIDGE

Dissolved oxygen, turbidity and temperature measurements were taken at the OCRD Bridge bi-weekly on average during the 2004 drawdown. Dissolved oxygen concentration ranged from 8.3 to 9.5 mg/L, turbidity ranged from 0.5 to 11.9 NTU, and temperature ranged from 16.1 5 ºC to 19.5 ºC (Appendix Q).

SLEEPY HOLLOW WEIR

Dissolved oxygen, turbidity and temperature measurements were taken near the Sleepy Hollow Weir (SHW) bi-weekly on average during the 2004 drawdown. Dissolved oxygen concentration ranged from 8.5 mg/L to 9.3 mg/L, turbidity ranged from 1.1 NTU to 8.6 NTU, and water temperature ranged from 15.7 ºC to 20.4 ºC.

Long-term water quality monitoring has also been conducted by the MPWMD at the SHW (MPWMD 2004, MPWMD 1998). Semi-monthly measurements of temperature, dissolved oxygen, pH, and specific conductance have been collected since WY 1992, and turbidity measurements have been collected since WY 2003. Results for water temperature and dissolved oxygen for the period from WY 1992 to WY 2003 at the SHW monitoring station are as follows:

- Minimum water temperature ranged from 7 ºC to 8 ºC and typically occurred in December and/or January. Maximum water temperature ranged from 21 ºC to 24 ºC and typically occurred in July and/or August.
- Minimum dissolved oxygen concentration ranged from 8 to 10 mg/L and typically occurred in June, July, August, and September. Maximum dissolved oxygen concentration ranged from 12 to 14 mg/L and typically occurred in January, February and March.

Turbidity measurements collected in WY 2003 at the SHW station ranged from 0 NTU (February) to 19 NTU (September) and averaged 4.1 NTU.

Since water year (WY) 1996, the MPWMD has recorded water temperature at the SHW monitoring station (MPWMD 2004, MPWMD 1998). A continuous recording temperature probe is typically deployed year-round. Minimum, maximum and average water temperatures are graphed by water year for the recorded data set. Minimum water temperatures of about 10 ºC typically occur in December and/or January. Maximum water temperatures of about 24 ºC typically occur in July and/or August.

2030 Baseline Conditions

It is expected that the reservoir would eventually fill with sediment (within 6 to 10 years) and uncontrolled sediment discharge would occur over the Dam spillway. This could result in elevated turbidity for short periods of time, primarily occurring during and shortly after storm runoff events. However, since turbidity already increases significantly during and after storm events, turbidity increases occurring during storm events after the reservoir has filled with sediment may not be measurably different than sediment discharge occurring during storm events under baseline conditions.

It is expected that interim drawdown would not be required after the reservoir fills with sediment (once reservoir capacity is less than 50-AF). Therefore, the water quality effects associated with drawdown would not occur. However, if shallow water levels exist in the reservoir, there may be associated temperature increases and dissolved oxygen decreases. Water discharged from the reservoir may increase in temperature relative to upstream conditions. The descent of water from the spillway or ports to the plunge pool would serve to aerate the water, thus increasing dissolved oxygen levels between the reservoir and downstream reaches.

4.3.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

The significance criteria for evaluating water quality impacts resulting from the Proponent's Proposed Project are based on the following considerations. In accordance with the CEQA, CEQA Mandatory Findings of Significance, and agency and professional standards, a project impact would be significant if the project:

- Substantially affects a rare or endangered species of animal or plant or the habitat of the species;
- Substantially diminishes habitat for fish, wildlife or plants;
- Contaminates a public water supply;
- Violates any water quality standards or waste discharge requirements;
- Substantially alters the existing drainage pattern in a manner which would result in substantial erosion or siltation;
- Creates a potential public health hazard or involves the use, production or disposal of materials which pose a hazard to people or animal or plant populations in the area affected;
- Creates or contributes runoff water which would provide substantial additional sources of polluted runoff; or
- Otherwise substantially degrades water quality.

4.3.3 IMPACTS AND MITIGATION

Impact Assessment Methodology

This assessment evaluates and identifies impacts over a range of temporal scales. Time frames for project impacts are based on Carmel River fisheries resources using the steelhead life-cycle. The three temporal impact categories are:

- Short-term impacts that occur within the construction period (concurrent with the number of construction seasons, which vary from one alternative to another);
- Long-term impacts that persist beyond the construction period.

Analysis of potential water quality impacts was based on a review of the proposed construction activities described for the Proponent's Proposed Project and each alternative, including staging, equipment, supplies, and techniques. Post-project operations were also reviewed to assess their potential for water quality impacts, where applicable. Those activities that would involve substantial levels of disturbance physically, temporally or geographically were also included in the water quality impact assessment.

Potential water quality impact mechanisms were identified based on the types of proposed construction activities. These include erosion and/or disturbance of soils, sediment and streambed materials; accidental spills or discharge of toxic substances; rerouting of streamflows; and discharge from sources of degraded water. The detailed Stormwater Pollution Prevention Plan (SWPPP) and the Spill Prevention, Containment, and Countermeasure Plan (SPCC) are included in Appendices K and R. These plans may be further modified during permit consultation with the Central Coast Regional Water Quality Control Board (CCRWQCB) and other appropriate permitting agencies. These plans provide the detailed mitigation procedures outlined in this section. The associated potential impacts could include elevated water turbidity, elevated water temperature, decreased dissolved oxygen concentration, and/or adverse levels of toxic substances in the water. Increases in river and/or reservoir water turbidity and temperature, decreases in dissolved oxygen concentration, and elevated levels of toxic substances could have an adverse impact on aquatic habitat and organisms or violate water quality standards.

The discussion of impact assessments and proposed mitigation measures are organized by activities that have a common potential impact mechanism and types of impacts. Potential impact mechanisms related to construction activities include:

- The presence of workers, equipment, machinery, and supplies within and along the active channel of Carmel River, San Clemente Creek and Tularcitos Creek and along portions of the access roads;
- Dewatering and/or rerouting portions of the live channel and reservoir during construction;
- Release of drawdown water and bypassed water;
- Excavation and relocation of sediment in the reservoir; and
- Destruction or construction of concrete structures.

Potential impact mechanisms related to operational activities include sediment sluicing and/or dredging and discharges and access/repairs for the CAW surface water diversion.

The following impact issues have been defined for water quality:

- WQ-1: Road Construction and Improvement Activities (Sediment Discharge to Watercourses)

- WQ-2: Instream, Streambank and/or Stream Margin Construction Activities (Disturbance of Streambeds, Increased Turbidity)
- WQ-3: Accidental Leaks and Spills of Toxic Substances (Discharge of Toxic Substances)
- WQ-4: Stream Diversions Sheetpile Cutoff Walls and Cofferdams (Increased Suspended Sediment and Turbidity)
- WQ-5: Stream Diversions Ponded Areas (Increased Turbidity and Temperature, Decreased Dissolved Oxygen)
- WQ-6: Stream Diversions Return of Bypassed Flows (Localized Scour, Sedimentation and Turbidity)
- WQ-7: Rewatering after Stream Diversions (Fine Sediment and Toxics In Return Flow)
- WQ-8: Discharge From Settling Basins (Increased Temperature and Turbidity, Decreased Dissolved Oxygen)
- WQ-9: Reservoir Drawdown (Increased Turbidity, Decreased Dissolved Oxygen)
- WQ-10: Reservoir Sediment Excavation (Increased Turbidity)
- WQ-11: SCD Fish Ladder (Increased Turbidity, Release of Toxic Substances)
- WQ-12: OCRD Notching (Increased Turbidity, Release of Toxic Substances)
- WQ-13: Sluice Gates (Increased Turbidity)
- WQ-14: Dam-Related Construction or Demolition (Increased Turbidity, Release of Toxic Substances)
- WQ-15: Operations/Post-Project Conditions (Improved Post-Project Water Quality in Reservoir and Restored Streams)
- WQ-16: Sediment Disposal (Stormwater Sediment Discharge)
- WQ-17: Construction of Diversion Channel and Diversion Dike (Increased Turbidity)

Issues WQ-16 and WQ-17 do not apply to the Proponent’s Proposed Project but are relevant to the effects of actions that would be undertaken under other alternatives. Impacts and Mitigation

Proponent's Proposed Project (Dam Thickening)

Issue WQ-1: Road Construction and Improvement Activities

Sediment discharge to watercourses, increased turbidity
*Determination: **less than significant with mitigation, short-term***

IMPACT

Access road construction and improvement activities for the Proponent's Proposed Project include the Tularcitos Route, the OCRD Bridge, and the Plunge Pool access road. Road improvements immediately upslope of the river, or where vegetation may be removed to accommodate road widening or new road construction could cause temporary to long-term localized changes in drainage patterns. These in turn could initiate slope instability, accelerate erosion, and introduce excess sediments to the stream channel. Road construction and improvements along the steep hillslopes and banks adjacent to the river could affect water quality by increasing turbidity.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level with implementation of the standard erosion control methods, BMPs, and associated water quality monitoring measures developed and included in the Storm Water Pollution Prevention Plan (SWPPP) (Appendix K) to ensure adequate protection of surface water quality in the Project Area. The SWPPP includes the project activities that will require the submittal of and implementation of BMPs, the associated monitoring of the BMPs, and provisions to halt construction/deconstruction activities if the BMPs are not effective, corrective measures should there be any problems with the BMPs, and provisions to re-initiate the construction/deconstruction activities. Compliance with measures identified in the SWPPP will ensure compliance with regulatory policies to minimize the potential for water quality impacts from construction activities. Specific BMPs may include construction of sediment barriers, straw bales, silt fences, sandbags and waterbars to control sediment from entering any water course. See Section 3 of the SWPPP (Appendix K).

The SWPPP may be modified during consultation with the CCRWQCB and other permitting agencies to include additional provisions to prevent impacts due to erosion and sediment input to project streams from construction/deconstruction activities. CAW has incorporated some of these mitigation measures as part of the Proponent's Proposed Project (Specifications Section 01560 Environmental Protection and Special Controls, Sections 1.02 and 1.06, [Woodward Clyde, December 9, 1998]). The specifications will be amended to require the contractor to submit BMPs that meet the measures specified in the SWPPP (Appendix K).

Issue WQ-2: Instream, Streambank, and/or Stream Margin Construction Activities

Disturbance of streambeds, increased turbidity
*Determination: **less than significant with mitigation, short-term***

IMPACT

The Proponent's Proposed Project would involve construction activities that require the use of machinery, equipment and workers in the streambed or vicinity of a stream and/or the removal of vegetation in the vicinity of a stream. These activities include installation of the Tularcitos Creek Bridge, improvement of the OCRD Bridge, modification of the OCRD, project staging in the plunge pool at the base of San Clemente Dam, dam foundation and face preparation, replacement of the San Clemente Dam fish ladder, and installation of sheetpile barriers in the Carmel River.

Instream and near-stream construction activities and/or vegetation removal may cause disturbance of streambed substrate, erosion of the streambank and soils of the stream margins, and/or the deposition of rock debris in and near the stream, resulting in increased stream turbidity at and downstream of the construction site.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level through implementation of measures identified in the SWPPP (Appendix K).

The SWPPP may be modified during consultation with the CCRWQCB and other permitting agencies to include additional provisions to prevent impacts due to erosion and sediment input to project streams from construction/deconstruction activities. CAW has incorporated some of these mitigation measures as part of the Proponent's Proposed Project (Specifications Section 01560 Environmental Protection and Special Controls, Sections 1.02 and 1.06, Woodward Clyde, December 9, 1998. The specifications will be amended to require the contractor to submit BMPs that meet the measures specified in the SWPPP and the BMPs will also include requirements of CDFG's 1601 and 1602 permits. The measures identified by the applicant will include, as a minimum, the following erosion control methods and procedures:

Erosion control measures such as small catch basins, filter fabrics, tarps, or straw bale barriers that prevent sediment from entering the Carmel River or Tularcitos Creek are installed, monitored for effectiveness, and maintained throughout the construction operations period. The detailed measures are described in Section 3, of the SWPPP (Appendix K),

Issue WQ-3: Accidental Leaks and Spills of Toxic Substances

Discharge of toxic substances
Determination: ***less than significant with mitigation, short-term***

IMPACT

Accidental leaks and spills of chemicals or fluids (including petroleum-based products) from equipment and machinery, wet concrete, concrete leachate or particulates, or demolition debris in the construction area could release potentially toxic substances directly to surface water, or to soil areas within the margins of the active channel. This would potentially violate water quality standards or impact aquatic resources.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level through implementation of BMPs identified in the SWPPP (Appendix K) and the SPCC Plan (Appendix R).

The SWPPP may be modified during consultation with the CCRWQCB and other permitting agencies to comply with additional regulatory requirements. The SWPPP requires contractors to submit a Spill Prevention, Containment, and Countermeasure (SPCC) Plan. The preliminary SPCC Plan (Appendix R) includes, at minimum, the following measures to protect water quality:

- Refueling of construction equipment and vehicles in the staging area would only occur within a designated, paved, and bermed area where possible spills can be contained. Fuel storage would be in double contained areas, capable of holding 125 percent of the volume of fuel being stored.
- Truck and cement equipment wash-down would not occur in the ordinary high water area of the channel.
- Equipment and vehicles operated within the ordinary high water would be checked and maintained daily to prevent leaks of fuels, lubricants, or other fluids to the stream.
- Litter and construction debris would be removed from below the ordinary high water line daily and disposed of at an appropriate site. All litter, debris, and unused materials, equipment or supplies would be removed from the construction staging areas above ordinary high water at the end of the construction season.
- At the end of each workday, all construction equipment will be moved to the staging area to protect against accidental spills.
- All vehicles carrying over 150 gallons of fuel will have a fuel spill prevention plan and all materials required to clean up a spill if it were to occur in transit. In some cases, a vehicle following the fuel truck would carry the clean-up equipment.

Issue WQ-4: Stream Diversions, Sheetpile Cutoff Walls, and Cofferdams

Increased suspended sediment and turbidity
Determination: ***less than significant, no mitigation required***

IMPACT

To implement the Proponent’s Proposed Project, stream diversions would be required the following areas: Tularcitos Creek, partial stream diversion at the OCRD (Old Carmel

River Dam) Bridge for construction, the Carmel River at the plunge pool, and the Carmel River above the reservoir. Stream diversions would be constructed by installing either coffer dams or sheetpile barriers in the stream, directing water around the construction area and downstream through a pipeline, and discharging water into the stream below the work area.

Installation of a sheetpile cutoff wall or coffer dam in the stream would cause increased suspended sediment near and immediately downstream. This could result in a temporary turbidity increase that would likely extend less than one mile downstream and persist for less than one day.

MITIGATION

The duration and extent of turbidity caused by installation of sheetpiles or check dams would not cause significant water quality effects. No mitigation would be required. A water quality monitoring program will be finalized and implemented as part of the SWPPP (Appendix K) to ensure no adverse effects to water quality will occur due to the construction activities. The monitoring program will be reviewed and approved by the CCRWQCB and other appropriate permitting agencies.

Issue WQ-5: Stream Diversions Ponded Areas

Increased turbidity and temperature, decreased dissolved oxygen
Determination: ***less than significant with mitigation, short-term***

IMPACT

Installation of sheetpile barriers or a check dam would create a ponded area with an increase of water temperature and turbidity. As water flows through the diversion pipeline, water temperature could undergo further increases, with associated decreases of dissolved oxygen concentration. Water discharged downstream of the construction area could have increased temperature and turbidity and decreased dissolved oxygen levels.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level with implementation of the following measures contained in the SWPPP. The SWPPP will be reviewed and finalized during consultation with the CCRWQCB and other appropriate permitting agencies.

- The bypass pipeline would be appropriately sized and designed to minimize heating and provide rapid transport of water around the construction site, to the release point downstream of the construction site. CAW would use white or reflective color for the pipeline to reduce solar heating.

Stream temperatures, dissolved oxygen and turbidity downstream of the Dam would be monitored during the construction period. CAW would establish criteria for maximum water temperatures, minimum dissolved oxygen, and maximum turbidity based on steelhead requirements and approved by CDFG and NMFS. Guidelines for these requirements have been established in the Biological Opinion provided by NMFS for the interim dam drawdown project (NMFS 2007). As part of the onsite biological monitoring, bypass water temperatures, dissolved oxygen, and turbidity would be monitored daily. If water temperatures exceed the criteria, the bypass flow would be mixed with cooler water from the upstream well point field to reduce temperatures in the Carmel River to an acceptable level.

Issue WQ-6: Stream Diversions Return of Bypassed Flows

Localized scour, sedimentation and turbidity
Determination: ***less than significant with mitigation, short-term***

IMPACT

Bypassed stream flows would be discharged back into the stream below the active construction area and could cause localized scour, sedimentation and turbidity effects.

MITIGATION

The project includes the installation of energy dissipation structures in the areas where bypassed project waters would be discharged. This would mitigate potential scouring, sedimentation and turbidity effects to a less than significant level. No further mitigation measures are needed.

Issue WQ-7: Rewatering After Stream Diversions

Fine sediment and toxins in return flow
Determination: ***less than significant with mitigation, short-term***

IMPACT

Following completion of construction activities, streamflow would be returned to the previously dewatered area. Water quality standards could be violated if fine sediments and/or toxic materials settled in the dewatered area during construction.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level through implementation of appropriate BMPs identified in the SWPPP (Appendix K). During permit consultation, the SWPPP may be further revised by the CCRWQCB and other appropriate agencies to comply with regulatory conditions.

Appropriate BMPs that could mitigate these impacts include use of a filter cloth or other fabric barrier placed on the ground surface of the active construction area to catch fine sediments, cement dust or other materials that are used or spilled during construction activities. All sand-size and finer construction fill and any angular crushed rock would be removed from the construction area and disposed of at an appropriate off-site location.

Issue WQ-8: Discharge from Settling Basins

Increased temperature and turbidity, decreased dissolved oxygen
*Determination: **less than significant with mitigation, short-term***

IMPACT

Temporary settling basins would be constructed below the plunge pool, at the OCRD Bridge, and in the reservoir near the 494-foot elevation intake. Water that is ponded in settling basins would experience increased temperature, decreased dissolved oxygen concentration and increased turbidity. This water may be discharged or leak around the bottom or edges of the settling basin into downstream waters, resulting in degradation of water quality.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level through implementation of BMPs identified in the SWPPP (Appendix K). The SWPPP and BMPs may be further revised during permit consultation with the CCRWQCB and other appropriate regulatory agencies. The BMPs selected to mitigate these impacts will include the following:

- Water would be pumped from the temporary settling basins to a sedimentation tank/holding facility located above the ordinary high water zone that allows only clear water to be returned to the stream. Settled solids would be disposed of at an appropriate off-site location.

- Routine monitoring and reporting of the discharge water and the receiving water conditions would be conducted. If effluent water quality does not meet water quality criteria, discharge would be discontinued until acceptable conditions are met. If necessary, additional water filtration would be implemented.

Issue WQ-9: Reservoir Drawdown

Increased turbidity, decreased dissolved oxygen
*Determination: **significant, unavoidable, short-term***

IMPACT

The lowering of water levels in the reservoir would cause increased turbidity and decreased dissolved oxygen levels. Although reservoir water temperatures naturally increase during the summer season, temperature stratification is unlikely and water temperature increases at depth in the reservoir could be greater than normal due to the shallow reservoir water level. Installation of a sheetpile barrier in the reservoir and removal of sediments near the intake gate would cause additional turbidity increases.

In addition to fine suspended solids, the release of stream channel porewater from the Carmel River and San Clemente Creek into the reservoir would cause iron oxidation to occur, further increasing turbidity and decreasing dissolved oxygen levels. During and following drawdown, movement of sediments previously deposited near the mouths of the Carmel River and San Clemente Creek could slump and shift into the reservoir. This sediment movement could cause further release of anaerobic porewater, resulting in lowered dissolved oxygen.

Because water quality degradation could not be mitigated to a less-than-significant level in the reservoir, this would be a short-term, significant and unavoidable impact.

MITIGATION

Water quality degradation resulting from drawdown of reservoir water level would not be mitigable to a less than significant level. The reservoir water level would be drawn down at a relatively slow rate (about 0.5 feet or less per day), similar to that currently being used for the annual drawdown (an interim dam safety measure). However, this measure would be employed to minimize impacts to the extent possible.

Issue WQ-10: Reservoir Sediment Excavation

Increased turbidity
Determination: ***less than significant with mitigation, short-term***

IMPACT

Some sediment would be excavated from the area around the 494-foot elevation intake in the reservoir. A temporary settling basin would be constructed around the intake gate. Installation of the settling basin and sediment excavation could result in elevated turbidity within the reservoir and in waters being discharged downstream.

MITIGATION

The excavation and construction work in the reservoir to clear sediment from behind the 494-foot intake gate would cause temporary increases in turbidity. Potential water quality effects would be mitigated to less than significant by implementing the BMPs identified in the SWPPP (Appendix K). The SWPPP and BMPs may be modified during permit consultation with the CCRWQCB and other appropriate regulatory agencies.

Erosion control measures such as use of small catch basins, filter fabrics, tarps, or straw bale barriers that prevent sediment from entering the Carmel River would be installed, monitored for effectiveness, and maintained throughout the duration of construction operations. Detailed measures are described in the SWPPP (Appendix K).

Issue WQ-11: SCD Fish Ladder

Increased turbidity, release of toxic substances
Determination: ***less than significant with mitigation, short-term***

IMPACT

Replacement of the San Clemente Dam fish ladder would involve the removal of hillslope vegetation, displacement of soil on the hillslope, destruction and removal of the current concrete fish ladder, and construction of the new fish ladder. The activities associated with removal and replacement of the San Clemente Dam fish ladder could cause hillslope erosion and delivery of fine sediments or concrete debris to the Carmel River, resulting in increased turbidity or release of toxic materials. These effects could potentially violate water quality standards or impact aquatic resources.

MITIGATION

Potential water quality effects associated with hillslope construction activities during replacement of the San Clemente Dam fish ladder would be mitigated to a less than significant level through implementation of BMPs identified in the project SWPPP and the SPCC Plan (Appendices K and R). These plans may be further modified during permit consultation with the CCRWQCB and other appropriate regulatory agencies. All applicable components of mitigation measures for Issues WQ-1 (Road Construction and Improvement Activities), WQ-2 (Instream, Streambank and/or Stream Margin Construction Activities), WQ-3 (Accidental Leaks and Spills of Toxic Substances) and WQ-7 (Rewatering after Stream Diversions) described above would be implemented.

Issue WQ-12: OCRD Notching

Increased turbidity, release of toxic substances
Determination: ***less than significant with mitigation, short-term***

IMPACT

Modification of the OCRD would involve notching one side of the concrete dam about 9-feet deep and 19-feet wide. Notching the OCRD would require cutting and removal of concrete within the streambed and stream margins. The release or deposition of concrete particles in surface waters could violate water quality standards or impact aquatic resources. This would be a potentially significant, mitigable effect.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level with implementation of appropriate BMPs and associated water quality monitoring identified as part of the project SWPPP (Appendix K). Mitigation measures for Issues WQ-2 (Instream, Streambank and/or Stream Margin Construction Activities), WQ-3 (Accidental Leaks and Spills of Toxic Substances) and WQ-7 (Rewatering After Stream Diversions) described above would be implemented.

Issue WQ-13: Sluice Gates

Increased turbidity
*Determination****: significant, unavoidable, long-term***

IMPACT

Installation and operation of sluice gates in the Dam would cause suspended sediment increases in the reservoir and in the Carmel River downstream of the Dam, resulting in elevated turbidity levels. Operation of sluice gates would likely occur once or twice a year over the life of the Dam. During the sluicing operation, as much as 2.4 acre-feet of sediment could be discharged downstream of the Dam over a 2-hour time period. Since this would occur on the rising limb of the hydrograph when flows are expected to continue increasing, a large proportion of the sediment would be carried downstream as suspended sediment. This would cause increased turbidity levels that would likely extend more than one mile downstream. The duration of elevated turbidity would depend on the actual length of time that sluicing was conducted as well as the actual flows that occurred. It is estimated that elevated turbidity would last from 12 to 36 hours.

MITIGATION

Operation of the sluice gates would occur during periods of high runoff, a time when natural high turbidity flows typically go over the spillway of San Clemente Dam. To initiate operation of the sluice gate, flows would be at a minimum of 300 cfs, occurring during a flow regime when any increase in turbidity would result in the least impact compared to baseline conditions. The detailed sluice plan is included in Sediment Management and Operations Plan (SOMP, Appendix J). While the turbidity increase is a small increase over the baseline occurring only for a short duration, it is not possible to conclude that water quality degradation resulting from sediment sluicing will be less than significant.. However, any potential impacts will be minimized to the extent possible by cooperating with the CCRWQCB, NMFS, CDFG and the USACE to establish appropriate turbidity standards and zones of dilution. In consultation with the regulatory agencies and Project Engineer, appropriate BMPs and water quality monitoring would be implemented to ensure adequate protection of aquatic resources during sluice gate operation. Measures to reduce construction-related turbidity impacts are identified in the SWPPP (Appendix K).

Issue WQ-14: Dam-Related Construction or Demolition

Increased turbidity, release of toxic substances and fine-grained sediment
Determination: ***less than significant with mitigation, short-term***

IMPACT

Storage of stockpiled raw materials, transfer of materials to concrete mixer trucks, transport of concrete in mixer trucks, and equipment storage presents the risk of particulate materials or chemicals washing onto the ground surface or accidentally spilling. Preparation activities on the Dam surface and adjacent bedrock surfaces present the risk of releasing fine-grained particles in the Carmel River channel. The application of wet concrete during dam thickening presents the risk of wet or dry concrete being released into the Carmel River channel. These materials could drain into surface or groundwater sources, resulting in unsafe levels of toxic substances and/or elevated turbidity.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level with implementation of the following measures that are included as part of the project SWPPP and SPCC Plan (Appendices K and R). Appropriate BMPs such as containment features would be identified and utilized for storage of stockpiled raw materials. The SPCC Plan identifies preventative measures to avoid spills of raw materials or wet concrete and includes a spill response and clean-up plan in the case of accidental spills.

Potential water quality impacts related to dam surface preparation and concrete application would be mitigated to a less than significant level by placing a fabric barrier on the ground surface below and near the work area to catch sediment and cement particles. These materials would be disposed of at an appropriate off-site location. A water quality monitoring program will be implemented as specified in the SWPPP to ensure the effectiveness of the installed BMPs.

The SWPPP and SPCC Plan will be reviewed and finalized during consultation with the CCRWQCB and other appropriate permitting agencies

Issue WQ-15: Operations / Post-Project Conditions

Improved post-project water quality in reservoir and restored streams
Determination: ***beneficial***

IMPACT

Under the Proponent's Proposed Project, upon project completion, annual drawdown of the reservoir will be discontinued. Consequently, water quality conditions that normally degrade due to the current annual drawdowns would be expected to return to normal summer conditions that existed without drawdown. This is a beneficial impact.

MITIGATION

No mitigation would be required.

Alternative 1 (Dam Notching)

Water Quality impacts and mitigation for Issue WQ-1 would be the same as described for the Proponent's Proposed Project, including the same road improvement activities, with the addition of road improvement activities for the Cachagua Route, but not for the Tularcitos Route. Water Quality impacts and mitigation for Issue WQ-2 (Instream, Streambank, and/or Stream Margin Construction Activities) would be the same as the Proponent's Proposed Project but the impacted area would be greater at 7.7 acres. Water Quality impacts and mitigation for Issues WQ-3 (Accidental Leaks and Spills of Toxic Substances), WQ-4 (Stream Diversion Sheetpile Cutoff Walls and Check dams), WQ-5 (Stream Diversions Ponded Areas), WQ-6 (Stream Diversions Return of Bypassed Flows), WQ-7 (Rewatering after Stream Diversions), WQ-8 (Discharge from Settling Basins), WQ-11 (SCD Fish Ladder), WQ-12 (OCRD Notching), and WQ-15 (Operations/Post-Project Conditions) would be the same as those described for the Proponent's Proposed Project except that Tularcitos Creek would not be affected. An additional construction stream diversion would occur on San Clemente Creek, which would require the same mitigation measures as described for other construction *diversions. WQ-13 (Sluice Gates) would be the same as the Proponent's Proposed Project although the impact would be greater with more sediment moving downstream but the mitigation would be the same.*

Issue WQ-17 (Construction of Diversion Channel and Diversion Dike) is specific to Alternative 3 (Carmel River Reroute and Dam Removal), and does not apply.

Issue WQ-9: Reservoir Drawdown

Increased turbidity, decreased dissolved oxygen
*Determination: **significant, unavoidable, short-term***

Impacts and mitigation would be similar to that described for the Proponent's Proposed Project (significant and unavoidable impact). However, the extent of the impact would likely be greater due to the need to conduct a faster drawdown to reduce the reservoir level below previous drawdown levels. Drawdown impacts would occur over three construction seasons.

Issue WQ-10: Reservoir Sediment Excavation

Increased turbidity, decreased dissolved oxygen
*Determination: **significant, unavoidable, short-term***

IMPACT

About 1.5 million cubic yards of sediment would be excavated using self-loading scrapers and transported to a central stockpile area within the reservoir area, where the material would be allowed to drain further. The stockpile area would be located at the mouth of the ravine where the sediment disposal site 4R is located.The reservoir level would be drawn down and a settling basin would be adjacent to the Dam. Fresh water inflow would be minimal due to the diversion of the Carmel River and San Clemente Creek around the reservoir. These activities would occur over a period of two summer seasons. Excavation of sediments above the reservoir could cause further turbidity increases and dissolved oxygen decreases within the reservoir through disturbance of sediments and subsurface flows. Very fine suspended sediments and iron oxides would be expected to remain in suspension in the reservoir, resulting in elevated turbidity and decreased dissolved oxygen levels during the two periods of excavation activity and for about two months following excavation.

MITIGATION

The effects of sediment excavation on turbidity and dissolved oxygen in the reservoir would be significant and unavoidable. No mitigation measures would reduce the impact to less than significant.

Issue WQ-14: Dam-related Construction or Demolition

Increased turbidity, release of toxic substances and fine-grained sediments
*Determination: **less than significant with mitigation, short-term***

IMPACT

Dam notching would involve the removal of about 700 cubic yards of concrete from the Dam by saw-cutting the concrete and reducing the size of concrete blocks using light blasting or hydraulic hammers. The release or deposition of concrete particles in surface waters could violate water quality standards or impact aquatic resources.

MITIGATION

Mitigation for Issues WQ-2 (Instream, Streambank and/or Stream Margin Construction Activities), WQ-3 (Accidental Leaks and Spills of Toxic Substances) and WQ-7 (Rewatering after Stream Diversions) as described for the Proponent's Proposed Project would be implemented.

Potential water quality impacts related to demolition activities would be mitigated to a less than significant level by implementing appropriate BMPs identified in the project SWPPP (Appendix K). Appropriate BMPs include placing blasting mats over the concrete blocks to prevent flying concrete debris. In addition, a fabric barrier would be placed on the ground surface in the active construction/demolition area to catch sediment and cement debris. A water quality monitoring program would be implemented as specified in the SWPPP, with oversight by the CCRWQCB, to ensure the effectiveness of the BMPs.

Issue WQ-16: Sediment Disposal

Stormwater sediment discharge at sediment disposal site
Determination: ***less than significant with mitigation, long term***

IMPACT

Sediment disposal would cover about 16 acres at the sediment disposal site 4R. Although erosion protection measures have been incorporated into Alternative 1 (described in Section 4.1.3, Alternative 1, Issue GS-4), sediment could potentially be entrained in the sediment disposal area during large and/or prolonged stormwater runoff events and discharged to the Carmel River, where it could cause sedimentation and increase turbidity. This would be a long-term, potentially significant and mitigable impact.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level by implementing appropriate BMPs identified in the SWPPP (Appendix K). The BMPs will be adopted in consultation with the CCRWQCB and will be adopted by the contractor and submitted to the Project Engineer for approval. The BMPs will include the following:

- The sloping sediment surface and other disturbed areas will be stabilized by sediment barriers, straw mulch, and silt fences.
- Provide sediment collection features such as silt bales and sandbags.

- Provide sediment traps along the toe of the pile and other disturbed areas.

- Monitor erosion control methods for effectiveness and maintain these methods throughout the duration of construction operations.

- Place two-foot-layer of organic soil on the sediment slope at the end of construction and seed

The effectiveness of erosion protection measures at Site 4R (as described in Section 4.1.3) would be monitored annually, as described in the SWPPP, for a period of 10 years at the end of each rainy season with additional monitoring conducted periodically during the rainy season to identify any imminent erosion problems from stormwater runoff providing an opportunity for the erosion to be mitigated with the incorporation of additional appropriate BMPs. Any observed erosion problems would be repaired or improved prior to the following rainy season. These adaptive measures may include further reinforcement of the sediment pile with rock and/or additional revegetation with native plants and trees.

Alternative 2 (Dam Removal)

Water Quality impacts and mitigation for Issue WQ-1 (Road Construction and Improvement Activities) would be the same as described for the Proponent's Proposed Project plus road improvement activities for the Cachagua Route, but not for the Tularcitos Route. Water Quality impacts and mitigation measures for Issues WQ-3 (Accidental Leaks and Spills of Toxic Substances), WQ-4 (Stream Diversion Sheetpile Cutoff Walls and Check dams), WQ-5 (Stream Diversions Ponded Areas), WQ-6 (Stream Diversions Return of Bypassed Flows), WQ-7 (Rewatering after Stream Diversions), WQ-8 (Discharge from Settling Basins), and WQ-12 (OCRD Notching) would be the same as described for the Proponent's Proposed Project, except that Tularcitos Creek would not be affected. There would be an additional construction stream diversion on San Clemente Creek which would require the same mitigation measures as described for other construction diversions. The sediment management methods for reservoir excavation would be the same as in Alternative 1. Therefore the impacts and mitigation for WQ-10 (Reservoir Sediment Excavation) are the same in kind as described in Alternative 1, but greater in scope because 2.5 million cubic yards of sediment would be excavated.

The San Clemente Dam fish ladder would be removed and Issue WQ-11 (SCD Fish Ladder) also would not apply. Since the Dam would be removed, Issue WQ-13 (Sluice Gates) would not apply.

Issue WQ-17 (Construction of Diversion Channel and Diversion Dike) is specific to Alternative 3, and does not apply.

Issue WQ-2: Instream, Streambank, and/or Stream Margin Construction Activities

Disturbance of streambeds, increased turbidity
*Determination: **less than significant with mitigation, short-term***

IMPACT

Impacts would be the same as described for the Proponent's Proposed Project, except that Tularcitos Creek would not be affected and San Clemente Dam would be completely removed under Alternative 2. The removal of San Clemente Dam would affect a larger area (approximately 8.9 acres) of instream, streambank and stream margin habitat.

MITIGATION

Mitigation measures would be the same as described for the Proponent's Proposed Project, except that the extent of required mitigation would be greater.

Issue WQ-9: Reservoir Drawdown

Increased turbidity, decreased dissolved oxygen
*Determination: **significant, unavoidable, short-term***

Under Alternative 2, the reservoir would be completely dewatered during project implementation. Therefore the drawdown of the reservoir would occur once during this Alternative. The impacts would be similar to the Proponents Proposed Project.

MITIGATION

Mitigation measures would be the same as described for the Proponent's Proposed Project.

Issue WQ-14: Dam-Related Construction or Demolition

Increased turbidity, release of toxic substances and fine-grained sediment
*Determination: **less than significant with mitigation, short-term***

IMPACT

Dam removal would involve the removal of about 7,000–8,000 cubic yards of concrete from the Dam by explosives or saw-cutting the concrete and reducing the size of concrete blocks using light blasting or hydraulic hammers. The release or deposition of concrete particles in surface waters could violate water quality standards or impact aquatic resources.

MITIGATION

Potential water quality impacts related to demolition activities would be mitigated to a less than significant level by implementing appropriate BMPs incorporated in the SWPPP (Appendix K). BMPs to mitigate these impacts include placing blasting mats over the Dam and concrete blocks to prevent flying concrete debris and placement of a fabric barrier on the ground surface in the active construction/demolition area to catch sediment and cement debris.

Issue WQ-15: Operations/Post-Project Conditions

Improved post-project water quality in reservoir and restored streams
*Determination**: beneficial***

IMPACT

Under Alternative 2, water quality conditions would not be affected by the presence of the reservoir and would be expected to be similar to conditions that currently exist upstream of the reservoir. This is would be a beneficial impact.

MITIGATION

No mitigation would be required.

Issue WQ-16: Sediment Disposal

Stormwater sediment discharge

*Determination: **less than significant with mitigation, long-term***

IMPACT

Impacts would be similar to those described for Alternative 1. Sediment disposal would cover about 23 acres at the sediment disposal site. Although erosion protection measures have been incorporated into Alternative 2 (described in Section 4.1.3, Alternative 1, Issue GS-4), sediment could be entrained in the sediment disposal area during large and/or prolonged stormwater runoff events and discharged to the Carmel River, where it could cause sedimentation and increase turbidity. This would be a long-term, potentially significant and mitigable impact.

MITIGATION

Mitigation would be the same as Alternative 1 WQ-16 (Sediment Disposal).

Alternative 3 (Carmel River Reroute and Dam Removal)

Water Quality impacts and mitigation for Issue WQ-1 (Road Construction and Improvement Activities) would be the same as described for the Proponent's Proposed Project, plus road improvement activities for the Cachagua route, but excluding the Tularcitos route. Impacts and mitigation for Water Quality Issues WQ-3 (Accidental Leaks and Spills of Toxic Substances), WQ-4 (Stream Diversion Sheetpile Cutoff Walls and Check dams), WQ-5 (Stream Diversions Ponded Areas), WQ-6 (Stream Diversions Return of Bypassed Flows), WQ-7 (Rewatering after Stream Diversions), WQ-8 (Discharge from Settling Basins), and WQ-12 (OCRD Notching) also would be the same as described for the Proponent's Proposed Project, except that Tularcitos Creek would not be affected. There would be an additional construction diversion on San Clemente Creek which would require the same mitigation measures as described for other construction diversions.

Water Quality Impacts and mitigation for Issues WQ-9 (Reservoir Drawdown) and WQ-15 (Operations/Post-Project Conditions) would be the same as described for Alternative 2.

The sediment management methods for reservoir excavation would be the same as in Alternative 1. Therefore the impacts and mitigation for WQ-10 (Reservoir Sediment Excavation) are the similar to those described in Alternative 1 but would be less because less than 500,000 cubic yards of sediment would be excavated.

The San Clemente Dam fish ladder would be removed and Issue WQ-11 (SCD Fish Ladder) also would not apply. Since the Dam would be removed, Issue WQ-13 (Sluice Gates) would not apply.

Issue WQ-2: Instream, Streambank, and/or Stream Margin Construction Activities

Disturbance of streambeds, increased turbidity
Determination: ***less than significant with mitigation, short-term***

IMPACT

Impacts would be the same as described for the Proponent's Proposed Project, except that Tularcitos Creek would not be affected and San Clemente Dam would be completely removed under Alternative 3. The removal of San Clemente Dam would affect a larger area (approximately 8.6 acres) of instream, streambank and stream margin habitat.

MITIGATION

Mitigation measures would be the same as described for the Proponent's Proposed Project, except that the extent of mitigations applied would be greater.

Issue WQ-14: Dam-Related Construction or Demolition

Increased turbidity, release of toxic substances
Determination: ***less than significant with mitigation, short-term***

Water Quality Impacts and mitigation for Issue WQ-14 (Dam-Related Construction or Demolition) would be similar to that described for Alternative 2.

MITIGATION

Potential water quality impacts related to demolition activities would be mitigated to a less than significant level by implementing appropriate BMPs incorporated in the SWPPP (Appendix K). BMPs to mitigate these impacts include placing blasting mats over the Dam and concrete blocks to prevent flying concrete debris and placement of a fabric barrier on the ground surface in the active construction/demolition area to catch sediment and cement debris.

Issue WQ-16: Sediment Disposal

Stormwater sediment discharge
Determination: ***less than significant with mitigation, long-term***

IMPACT

Impacts would be similar to those described for Alternative 1 except that sediment disposal would cover about 13 acres in the bypassed arm of the Carmel River. Although erosion protection measures have been incorporated into Alternative 3 (Section 3.5.4 and Section 4.1.3, Alternative 1, Issue GS-4), sediment could be entrained in the sediment disposal area during large and/or prolonged stormwater runoff events and discharged to the Carmel River, where it could cause sedimentation and increase turbidity. This would be a long-term, potentially significant and mitigable impact.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level by implementing the measure described below. Appropriate BMPs incorporated in the SWPPP (Appendix K) will be implemented by contractor with approval by the Project Engineer and the RWQCB and other appropriate regulatory agencies. The BMPs will include the following:

- The sloping sediment surface and other disturbed areas will be stabilized by sediment barriers, straw mulch, and silt fences.
- Provide sediment collection features such as silt bales and sandbags.
- Provide sediment traps along the toe of the pile and other disturbed areas.
- Monitor erosion control methods for effectiveness and maintain these methods throughout the duration of construction operations.
- Place two-foot-layer of organic soil on the sediment slope at the end of construction and seed.

The effectiveness of erosion protection measures in the bypassed arm of the Carmel River (described in Sections 3.5.4 and 4.1.3) would be monitored annually by CAW for a period of 10 years at the end of each rainy season. Any observed erosion problems would be repaired or improved prior to the following rainy season. These adaptive measures may include further reinforcement of the sediment pile with rock and/or additional revegetation with native plants and trees.

Issue WQ-17: Construction of Diversion Channel and Diversion Dike

Increased turbidity
Determination: ***less than significant mitigation, short-term***

IMPACT

Diversion channel construction would involve blasting and removal of about 234,000 cubic yards of rock between the two reservoir arms, reducing the rock into 1-foot or smaller pieces using hoe rams, and relocating the rock to build a diversion dike. Channel excavation activities would include construction of bankfull and thalweg channels in the diversion channel. These activities could cause the discharge of rock debris and the mobilization of fine sediments into San Clemente Creek and the Carmel River, resulting in elevated turbidity levels. Impacts related to construction activities would be short-term, whereas impacts related to erosion of the diversion channel or diversion dike following the project would be long-term.

MITIGATION

Potential water quality impacts would be mitigated to a less than significant level through implementation of BMPs incorporated in the SWPPP (Appendix K). Mitigation applying to Issues WQ-2 (Instream, Streambank and/or Stream Margin Construction Activities), WQ-3 (Accidental Leaks and Spills of Toxic Substances) and WQ-7 (Rewatering after Stream Diversions) described for the Proponent's Proposed Project would be implemented. In addition, a blasting mat would be used to catch and direct flying rock debris to an area where it can be readily removed. This material would be disposed of at an appropriate on-site location in the Carmel arm of the reservoir.

Alternative 4 (No Project)

Impacts and mitigation for Water Quality Issues WQ-1 (Road Construction and Improvement Activities), WQ-2 (Instream, Streambank, and/or Stream Margin Construction Activities) and WQ-3 (Accidental Leaks and Spills of Toxic Substances), applied to improvement activities at the OCRD Bridge and ongoing reservoir and dam maintenance, WQ-4 (Stream Diversions Sheetpile Cutoff Walls and Check dams), WQ-5 (Stream Diversions Ponded Areas), WQ-6 (Stream Diversions Return of Bypassed Flows), WQ-7 (Rewatering After Stream Diversions), and WQ-8 (Discharge from Settling Basins), WQ-10: (Reservoir Sediment Excavation), WQ-11 (SCD Fish Ladder), WQ-12 (OCRD Notching), and WQ-13 (Sluice Gates) WQ-14 (Dam-Related Construction or Demolition), WQ-16 (Sediment Disposal), and WQ-17 (Construction of Diversion Channel and Diversion Dike) address activities that would not be undertaken under the No Project Alternative, and would not apply.

Issue WQ-9: Reservoir Drawdown

Increased turbidity, decreased dissolved oxygen
*Determination**: significant, unavoidable, long-term***

IMPACT

Annual reservoir drawdowns would continue under the No Project Alternative until sediment has reduced the reservoir capacity to less than 50 AF (6 to 10 years). The lowering of water level in the reservoir would cause increased turbidity and decreased DO levels. Although reservoir water temperatures naturally increase during the summer season, water temperature increases at depth in the reservoir could be greater than normal due to the shallow reservoir water level.

In addition to fine suspended solids, the release of stream channel porewater from the Carmel River and San Clemente Creek into the reservoir would cause iron oxidation to occur, further increasing turbidity and decreasing DO levels. During and following drawdown, movement of sediments previously deposited near the mouths of the Carmel River and San Clemente Creek could slump and shift into the reservoir. This sediment movement could cause further release of anaerobic porewater, resulting in lowered DO.

MITIGATION

Mitigation for impacts from Issue WQ-9 would not occur under the No Project Alternative.

Issue WQ-15: Operations / Post-Project Conditions

Increased turbidity, decreased dissolved oxygen
Determination: ***significant, unavoidable, long-term***

IMPACT

Existing operations would continue under the No Project Alternative. Potential impacts are the same as described for Issues WQ-9 (Reservoir Drawdown).

MITIGATION

Mitigation for impacts from Issue WQ-15 would not occur under the No Project Alternative.

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4.4 FISHERIES

This section describes existing conditions for aquatic habitat and fishery resources in the Carmel River and the Project Vicinity. It also provides an assessment of potential environmental impacts that would occur as a result of the implementation of the Proponent's Proposed Project or project alternatives. Fisheries and aquatic habitat information was taken from the 2000 RDEIR (Denise Duffy & Associates 2000), which is incorporated here by reference. Materials also reviewed included the Carmel River Dam and Reservoir Project Draft Supplemental EIR (MPWMD 1998), the Carmel Valley Watershed Conservancy assessments and the 2003, 2004 and 2005 to 2007 Biological Assessments for the San Clemente Dam Drawdown, the 2003, 2004 and 2005 Drawdown Reports, the Monterey Peninsula Water Supply Project EIR (MPWMD 1994) and information available on the web from MPWMD, the Carmel Valley Watershed Conservancy and the Carmel River Steelhead Association. Additional materials that were used in the completion of this section are referenced in the following text and included in the reference section. Expanded sediment transport modeling has been incorporated in the revised Sections 4.2 and 4.4 as a response to comments on the Draft EIR/EIS. In addition, some of the fisheries impacts were modified based on comments received on the Draft EIR/EIS.

4.4.1 ENVIRONMENTAL SETTING

The Carmel River currently supports native populations of Pacific lamprey *(Lampetra tridentata),* river lamprey *(Lampetra ayresi),* Sacramento hitch *(Lavinia exilicauda),* Sacramento blackfish (*Orthodon microlepidotus*), steelhead *(Oncorhynchus mykiss),* threespine stickleback *(Gasterosteus aculeatus),* prickly sculpin *(Cottus asper) and* coast range sculpin *(Cottus aleuticus).* Starry flounder *(Platichthys stellatus),* shiner perch *(Cymatogaster aggregata)* and Pacific staghorn sculpin *(Lepotocottus armatus)* can be found in the Carmel River lagoon (MPWMD 1994). Introduced fishes found in the Carmel River include goldfish *(Carassius auratus)*, carp *(Cyprinus carpio),* black bullhead *(Ictalurus melas),* brown trout *(Salmo trutta),* mosquitofish *(Gambusia affinis),* green sunfish *(Lepomis cyanellus),* and bluegill *(L. macrochirus)* (MPWMD 1994). Hitch, blackfish, steelhead, brown trout, threespine stickleback, mosquitofish and green sunfish are known to occur in the Project Area (ENTRIX 2003, 2004c, and 2005a).

There are two non-native crayfish found in the Carmel River, the signal crayfish (*Pacifasticus leniusculus*) and red swamp crayfish (*Procambarus clarkii*). The signal crayfish is commonly found in all habitats in the Carmel River mainstem. The red swamp crayfish is found in the river infrequently.

Of the fish species present in the river, steelhead are considered the most important management species. Most fisheries work in the river has been undertaken to add to knowledge of steelhead, their habitats and their use of that habitat. The Carmel River historically supported what the CDFG described in a 1983 report as the State's largest self-sustaining steelhead run (and the second largest fishery for this species) south of

San Francisco Bay (Snider 1983). Most of the habitat needs of other native fish species in the river would be met by maintaining steelhead habitat.

4.4.1.1 Steelhead Terminology

Steelhead is the anadromous form of coastal rainbow trout or *O. mykiss*, although steelhead may also exhibit a life history type that spends its entire lifecycle in freshwater. Anadromy is a life history pattern in which growth and maturity occur in saltwater, but spawning, incubation and a portion of the juvenile rearing occur in freshwater.

Steelhead spawn in locations in the streambed that have good intergravel flow through a gravel substrate to a small cobble substrate. These locations are often at the top of riffle or the very downstream end of a pool, also called a pool tail. The female steelhead will excavate a depression in the streambed by pumping her tail over the stream bottom. Eggs are released into the depression and fertilized by one or more males. This activity is repeated when the female moves upstream. The zygotes (fertilized eggs) are then covered in gravel as the female continues spawning. Spawning continues until the spawning fish have moved out of suitable spawning habitat or the female runs out of eggs. The area where steelhead have spawned is called a redd and may consist of a single or several nests of fertilized eggs covered with gravel.

Embryos incubate in the gravel for three to eight weeks (longer incubations are associated with lower temperatures). Alevins (also called sac fry or yolk-sac fry) are young steelhead that have recently hatched and remain in the gravel for another two to three weeks while they absorb their yolk sacks. When the yolk-sac has been absorbed, the fish emerge from the gravel and enter the water column as fry at a length of about an inch. These fish are called fry until they reach a size of about two and half inches. Larger steelhead are generally referred to as juveniles (two and a half inches to 8 inches or larger). Steelhead that are in their first year of life are called young-of-the-year (YOY) and are referenced as 0+ or YOY in this document. YOY includes fish that range from one-inch up to four to six inches in size by the end of their first year. Steelhead in their second year of life are called yearlings and are referenced as 1+ or yearlings in this document. These fish range in size from four to six inches early in the year to up to eight inches or larger in the fall. Growth rates vary depending on stream conditions, particularly temperature and food availability.

The Carmel River supports at least two year-classes of juvenile steelhead (0+ and 1+) in an ongoing cycle of spawning, growth and outmigration. As Age 1+ fish grow, become smolts and migrate to the ocean, a new crop of YOY steelhead populate the river from spawning that occurred during the previous winter and spring. Last year's YOY fish develop into yearlings.

When steelhead reach about eight inches long, most will become smolts. Smolting is a physiological change that prepares steelhead for life in the ocean. The physiological change is accompanied by changes in appearance and behavior. Smolts actively move downstream toward the ocean as their residency time in freshwater comes to an end.

Unlike salmon, adult steelhead do not always die after spawning. Spawned out steelhead, called kelts, can migrate back to ocean and return as repeat spawners in a subsequent year (Barnhart 1986).

4.4.1.2 Carmel River Habitat

In this section, fish habitat is discussed in the context of its suitability for steelhead trout and includes spawning, incubation, rearing and migration habitats which are described below.

Spawning and incubation habitat is typically gravel-cobble substrate at the downstream end of pools or upstream end of riffles. Good quality spawning habitat includes sufficient depth of flow and water velocity over suitable substrate.

Rearing habitat supports the growth and development of juvenile steelhead from fry to Age 2+ juvenile. Good quality juvenile rearing habitat is characterized by sufficient streamflow, water quality (cool, clear, oxygenated water), sufficient water depth, and cover. Cover can be provided by rocky substrates, closely overhanging branches from trees or other riparian vegetation, instream woody debris, surface turbulence, depth greater than 3 feet, or other cover elements. Good quality rearing habitat also has sufficient aquatic and terrestrial invertebrates, key food resources used by developing steelhead. Fry grow rapidly through the spring, and as they grow they move from shallow (< 2 inches) river edge habitats, where water velocities are low, into deeper water in riffles, runs, and pools. Age 1+ steelhead use deeper habitats; some of the juveniles move downstream and use the lagoon as rearing habitat.

Rearing habitat has been assessed, modeled and compared for reaches upstream, downstream and between the two dams on the Carmel River because the dams are sites where migration may be impaired. To place the locations of the dams in context for the reader, San Clemente Dam (SCD) is located at River Mile (RM) 19.1 and Los Padres Dam (LPD) is located at RM 25.3 (Table 4.4-1). There are about five river miles between LPD and the historic inundation zone of SCD. There are ten river miles of mainstem Carmel River habitat upstream of Los Padres Reservoir.

Migration habitat is the access corridor through the river — the route used by upstream migrating adults and downstream migrating kelts and smolts. Upstream migration can be impaired or blocked at the mouth of the river, at shallow riffles, road crossings, dams or waterfalls. Downstream passage can be impaired by passage down or over spillways. Minimum depth of flow for upstream adult salmonid passage through culverts is one foot (NMFS 2002) and in an open channel is eight-tenths of a foot of water over a contiguous twenty five percent of the channel width (Thompson 1976). The depth of flow criteria for passage for juvenile steelhead is six-tenths of foot of water.

Table 4.4-1: Comparison of Fishery and Geomorphic Reaches

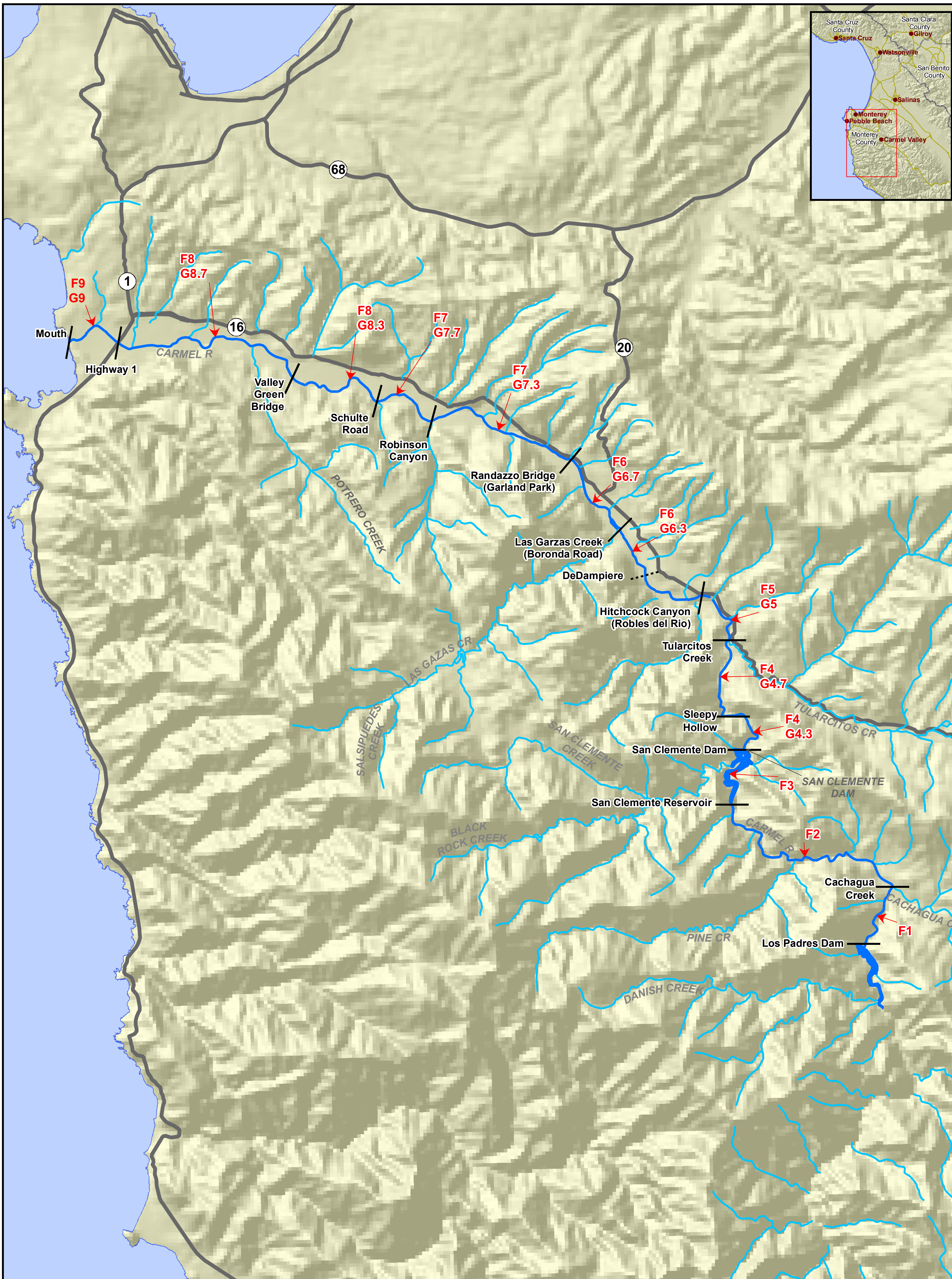
Geomorphology reach no.	Length (mi)	Fisheries reach no.	Length (mi)	Reach description**	Upstream station (River Mile)	Downstream station (River Mile)
		1	1.3	Los Padres Dam to Cachagua Creek	25.3	24
		2	4	Cachagua Creek to San Clemente Dam	24	20
		3	0.9	San Clemente Dam	20	19.1
4.3	1.7	4	3	San Clemente Dam to Sleepy Hollow	19.1	17.4
4.7	1.3			Sleepy Hollow to Tularcitos Creek	17.4	16.1
5	1.3	5	1.3	Tularcitios Creek to Hitchcock Canyon	16.1	14.8
6.3	2.2	6a, b, c*	4.6	Hitchcock Canyon** to Las Garzas Creek	14.8	12.6
6.7	2.4			Las Garzas Creek to Randazzo Bridge	12.6	10.2
7.3	2.1	7	3.5	Randazzo Bridge to Robinson Canyon	10.2	8.1
7.7	1.4			Robinson Canyon to Schulte Road	8.1	6.7
8.3	1.9	8	5.6	Schulte Road to Valley Green Bridge	6.7	4.8
8.7	3.7			Valley Green Bridge to Highway 1	4.8	1.1
9	1.1	9	1.1	Highway 1 to mouth	1.1	0
Total length	**19.1**	**Total length**	**25.3**			

NOTES:
*Fisheries reach no. 6 consists of three subreaches:
6a 1.5 Robles del Rio** to DeDampiere
6b 1.5 DeDampiere to Borondo Road
6c 1.6 Borondo Road to Garland Park

As is the case in most Central and South-Central Coast rivers, the Carmel River mouth is closed by a sandbar during the dry season (late spring through the first rains of the following winter). During dry years, all migration can be blocked at the mouth of river if the sand bar does not open, which happened in 1976 and 1977 and 1988 to 1990. When the sand bar is open and flows are less than about 45 to 60 cfs, upstream passage in the river can be impaired by shallow, wide riffles between the mouth and the Robles del Rio gage site. Several riffles have been identified in the Carmel Valley that in some years can become critical impediments to migration at low flows. These "critical riffles" change from one year to the next so they may not always present a passage problem, depending on the bed form and river flows.

Habitat Reaches

Fishery Habitat Reaches for the Carmel River are shown in Figure 4.4-1. Fishery Habitat Reaches are slightly different than geomorphic reaches. Fishery reaches extend to upstream of SCD, whereas Geomorphic Reaches are identified in the river downstream of SCD. Geomorphic reaches are divided into shorter sub-reaches in Reaches 4, 7, and 8 compared to the fish reaches. Reach 6 is divided into three subreaches for fish (6a, 6b, and 6c) and two for geomorphic assessment (6.3 and 6.7). Both reach types are shown on Figure 4.4-1 in plan view, a comparison of the two reach types in profile is provided in Figure 4.4-2 and a crosswalk table is provided in Table 4.4-1. Reach lengths are provided in Table 4.4-1.



Legend

Carmel River Reach*

Stream

Highway

Reach Break

* F9, F8, etc. = Fisheries Reaches
G9, G8.7, etc. = Geomorphology Reaches

Projection: California State Plane, Zone IV
Datum: NAD 83 Units: Feet

San Clemente Dam EIS/EIR

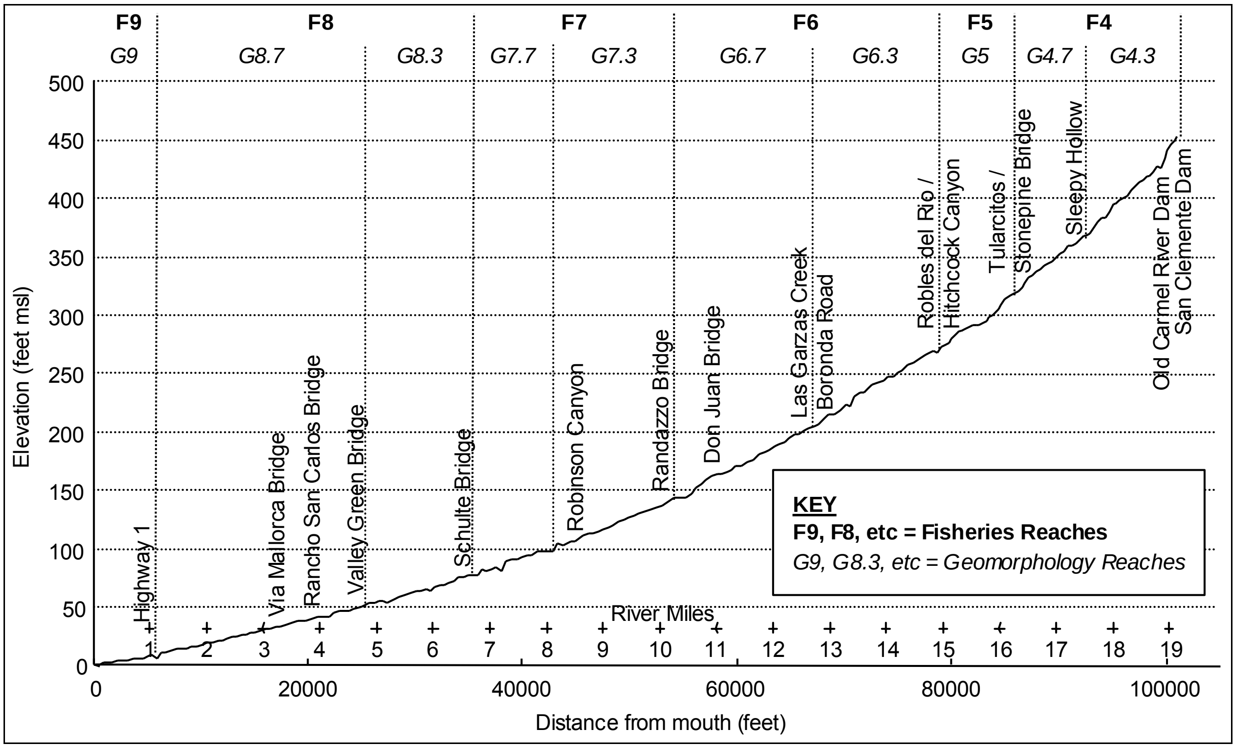
Figure 4.4-1

Carmel River Reach Designations

0 1 2 4 Miles N

D:\GIS\Entrix\3018605\map\SC_ReachBreaks_17ill1_01.mxd 12/22/2005 2:30:37 PM Mukhtyar

Figure 4.4-2: Stream Profile Showing Fishery and Geomorphic Reaches



The 10 fish habitat reaches identified in the Carmel River extend from upstream of LPD to the mouth of the river. The reaches are numbered from 0 to 9 from upstream to downstream and are discussed below.

REACH 0

Reach 0 encompasses the Carmel River above LPD. Steelhead access this reach via two ladders at LPD that lead to fish traps and a truck operation that takes steelhead from the traps and transports them over the top of the Dam where they are released into the reservoir. Downstream passage occurs through the spillway. Upstream of the reservoir there are approximately ten miles of mainstem habitat above the reservoir and a total of 14.4 miles of accessible habitat in the Carmel River and its tributaries.

Habitat upstream of the reservoir provides spawning, incubation and rearing habitat. All channels are located within the Ventana Wilderness area and flows are unregulated. Deep pools, separated by short, shallow glides typify the habitat, and include long, cobble/boulder riffles and runs. Habitat modeling studies (Dettman and Kelley 1986, Dettman 1990) of Rearing Habitat (RH) were done for three sections of the river; upstream of Los Padres Reservoir (Reach 0), between LPD and the back of San Clemente Reservoir (Reaches 1 and 2) and downstream of LPD (Reaches 4, 5, 6 and 7). This study did not include Reach 3 or any of the reaches downstream of Reach 7. Based on the RH assessment, approximately 39 percent of Age 0+ and 23 percent of

Age 1+ rearing habitat for the Carmel River mainstem is located upstream of Los Padres Reservoir. The reservoir also provides some rearing habitat.

REACH 1

Reach 1 encompasses the 1.3 miles of the Carmel River from LPD to the Cachagua Creek confluence. The Carmel River in this reach is controlled by bedrock outcrops and large boulders. The reach provides a limited amount of gravel for spawning and incubation but does contain good rearing habitat. Minimum summer streamflow released from Los Padres Reservoir benefits rearing within this reach. Cachagua Creek contains about 8 miles of spawning and rearing habitat, but because of limited summer flows, only about 4 miles of seasonal rearing habitat is available during normal to wet years. Reach 1 has no barriers to migration downstream of LPD.

REACH 2

Reach 2 encompasses the four-mile stretch of river from the Cachagua Creek to the upper end of the historic extent of San Clemente Reservoir, which includes access to the Pine Creek tributary.

The Carmel River has good spawning, incubation and rearing habitat in this reach. Minimum summer streamflow released from Los Padres Reservoir benefits rearing within this reach. About 33 percent of Age 0+ and twenty percent of Age 1+ rearing habitat in the Carmel River occurs between SCD and LPD (Reaches 1 and 2). Reach 2 has no barriers to migration.

REACH 3

Reach 3 is the area that was originally inundated by San Clemente Reservoir. The reservoir now is filled with sediment through which the Carmel River has reestablished about 0.9 mile of channel. Good quality habitat has developed in the channel along its flood plain to within about 1,400 feet of the Dam. This part of the river supports steelhead spawning, incubation, rearing and migration. The lower 1,200 feet of channel is mostly a sand bed channel and supports some rearing habitat. The small reservoir that remains supports some rearing. Upstream migration occurs via a fish ladder at SCD. The fish ladder rises about 68 feet through a series of 28 pools and weirs. Downstream migration occurs over the spillway or via the ladder when the reservoir is spilling, but only via the ladder when the reservoir is not spilling. During the Annual Drawdown for Interim Seismic Safety Measures, downstream migration can occur through a fish bypass system into the ladder and upstream migration is not possible. The ladder is not operable at any time the reservoir is near or below the invert elevation of the fish ladder (524.5 feet). San Clemente Creek, flows into the reservoir and provides access to about 5 miles of tributary channels that provides spawning, incubation and rearing habitat.

Existing stream channels within the former inundation area of the reservoir will continue to evolve as sediments are deposited and reworked by fluvial processes and riparian vegetation becomes established and develops. Carmel River aquatic habitat conditions are good along the upper 3,200 feet of this reach and poor along the lower 1,200 feet. In 2005, open water habitat in the reservoir covered about 100 to 200 feet of the former Carmel River channel and about 850 feet of the former San Clemente Creek channel.

REACH 4

Reach 4 encompasses a three mile stretch of river from SCD to the confluence of Tularcitos Creek. The river has no tributaries in this reach and is confined in a rocky, steep-sided canyon. The river is bordered by a thin strip of riparian vegetation, primarily comprised of alders with an occasional large sycamore, willow, or cottonwood tree. From SCD downstream to Tularcitos Creek, the river is armored with cobble and boulder-sized materials. This reach supports rearing and migration but is nearly devoid of any spawning habitat because of sediment storage behind SCD. Two partial passage barriers occur in Reach 4 downstream of SCD. The OCRD is located about 0.34 mile downstream of SCD in Reach 4. Migration occurs past OCRD through a gate that has been permanently opened on the east side of the Dam. Flow from the gate can be obscured during moderate flows of about 800 to 900 cfs when spill over the entire crest of OCRD occurs. Migration may be delayed when fish attempt to jump the Dam instead of swim through the gate. Adult steelhead that successfully jump the Dam enter a very high velocity flow at the Dam crest and can be swept back downstream. At a few hundred cfs, another partial passage barrier can develop in the culverts and over the road crossing at the Sleepy Hollow Ford. During flows in this range velocities in the culverts can be too high to support upstream passage and flows over the roadway can to be too fast and shallow for easy upstream passage. The Sleepy Hollow Ford is located about 0.9 mile downstream of SCD. The Sleepy Hollow Steelhead Rearing Facility (SHSRF) is located just downstream of the Sleepy Hollow Ford within Reach 4. The SHSRF is used to rear juvenile steelhead rescued from the lower Carmel River and tributaries. Rescues are required when surface flow declines or ceases during the dry season and strands juvenile fish in isolated pools or stream sections. Rescues are required in most years.

REACH 5

Reach 5 encompasses the 1.4-mile section from the Tularcitos Creek confluence down to Robles del Rio and includes two tributaries; Tularcitos and Hitchcock creeks. Tularcitos Creek supports some spawning and rearing. Hitchcock Creek is a seasonal tributary and supports some spawning, incubation and early fry rearing in wet years. The river is still confined in a rocky canyon, but it is wider and less confined than Reach 4. The substrate is primarily cobble, gravel, and sand. Residential encroachment has affected bank conditions and associated habitat along this reach from about Camp Stephani downstream to Robles del Rio. This reach supports spawning, incubation, rearing and migration.

REACH 6

Reach 6 encompasses 4.4 miles of the Carmel River from Robles del Rio down to the Scarlett Narrows. Downstream of Robles del Rio the Carmel River is an alluvial river flowing between terraces and in an active floodplain. This reach has a wide channel bordered by riparian vegetation. Numerous houses exist along the banks of the river and on the terraces. This reach supports spawning, incubation, rearing and migration. During dry years, a short section at the downstream end of Subreach 6a can go dry. A potential barrier to fish passage exists within Subreach 6b upstream of Boronda Road where a critical riffle occurs. The tributary of Las Garzas Creek joins the Carmel River at RM 8.7 and supports about two to three miles of spawning and incubation habitat but provides only limited rearing habitat because of the seasonal nature of streamflow in this tributary.

About 28 percent of Age 0+ and 23 percent of Age 1+ rearing habitat in the Carmel River occurs downstream of SCD in reaches 4, 5, and 6 (Dettman and Kelley 1986, Dettman 1990). About 41 percent of the spawning habitat in the mainstem Carmel River occurs downstream of SCD (Dettman 1990).

REACH 7

Reach 7 encompasses the 3.4-mile stretch from the Narrows down to the Schulte Road Bridge. Robinson Creek is the main tributary in this reach. The Carmel River in this reach is an alluvial river with a bed comprised of cobble, gravel, and sand. The channel is bordered for the most part with healthy stands of riparian vegetation. This reach supports spawning, incubation, rearing and migration habitat. In years with limited rainfall, this reach can dry back as far upstream as the confluence with Robinson Canyon Creek. Only about a mile of Robinson Canyon Creek supports steelhead spawning, incubation and some rearing.

REACH 8

Reach 8 extends for 2.4 miles from the Schulte Road Bridge to Highway 1. Potrero Creek is the main tributary to this reach. The river valley in this reach is wide, the channel is incised in old terraces, and banks are often lined with rip-rap. Houses, golf courses, and agriculture border the channel. The streambed is comprised primarily of sand and provides very limited spawning and incubation habitat. Some rearing can occur in the upper portion of this reach throughout the summer months during wet years. During dry water years, this reach can completely dry up. The reach does support migration during the winter period. Potrero Creek has limited habitat for spawning, incubation and rearing habitat that is limited to a maximum of about 1.5 miles of channel upstream from the golf course.

REACH 9

Reach 9 is the 1.1-mile section of stream channel and lagoon downstream of State Highway 1 and extending to the mouth of the Carmel River. There are no tributaries in this reach. This reach is bordered on both sides by levees, contains a sand bed and does not support spawning or incubation. Recent work along the Carmel River for restoration of the lagoon and wetland has removed some of the levees along the south bank downstream of Highway 1. Rearing habitat is limited by available surface water in the flowing channel. Most rearing is confined to the lagoon except in very wet years when flows persist through the summer. Rearing within the lagoon occurs in all years, primarily for 1+ and older juveniles. In some years the lagoon can provide very important rearing habitat for the Carmel River watershed. The primary importance of this reach is the critical role of lagoon habitat for juveniles and smolts.

Adult access into the river is determined by the status of the river mouth during the migration season (January through May). Typically, the first storms of the year will open the sandbar at the mouth of the river by mid-December, and continuing storms or subsequent streamflow will keep the mouth open into May or June. The mouth closes when average daily flows fall below about 20 cfs.

4.4.1.3 Status of Carmel River Steelhead

Concern over the ongoing decline in steelhead numbers has lead to protective measures directed at controlling the harvest of adults, providing suitable spawning grounds, and maintaining rearing habitat for juvenile steelhead. The CDFG has expressed concern for many years that the steelhead population in the Carmel River is threatened with becoming a remnant run due to the development of water resources, drought, and watershed, land use, and environmental problems (CDFG 1986, Snider 1983). CDFG's policy and goal for managing the steelhead resource is to "maintain it as a self-sustaining resource and to restore it as much as possible to its historic level of productivity" (McEwan and Jackson 1996).

NMFS 1996 status review of west coast steelhead populations (Busby et al. 1996) and NMFS final rule under the federal ESA (August, 1997) identified 15 population units of steelhead, called Evolutionarily Significant Units (ESUs)[1]. The Carmel River is within the South-Central California Coast (SCCC) ESU, which is designated as threatened. This DPS includes all naturally spawned fish (and their progeny) in streams below impassable barriers, from the Pajaro River (inclusive) in Santa Cruz County to (but not including) the Santa Maria River in southern San Luis Obispo County. The designated Critical Habitat for steelhead in the Carmel River (Federal Register September 2, 2005) includes all accessible reaches of the river including areas upstream of LPD where a trap and truck operation has occurred since 1949.

The Carmel River supports the largest run of about 27 anadromous streams within the SCCC DPS. Many of the streams in the SCCC DPS are short and occupy smaller watersheds compared to the Carmel River. The Carmel River is the only river within the DPS that has long-term data on adult returns and juvenile abundance. Run sizes in

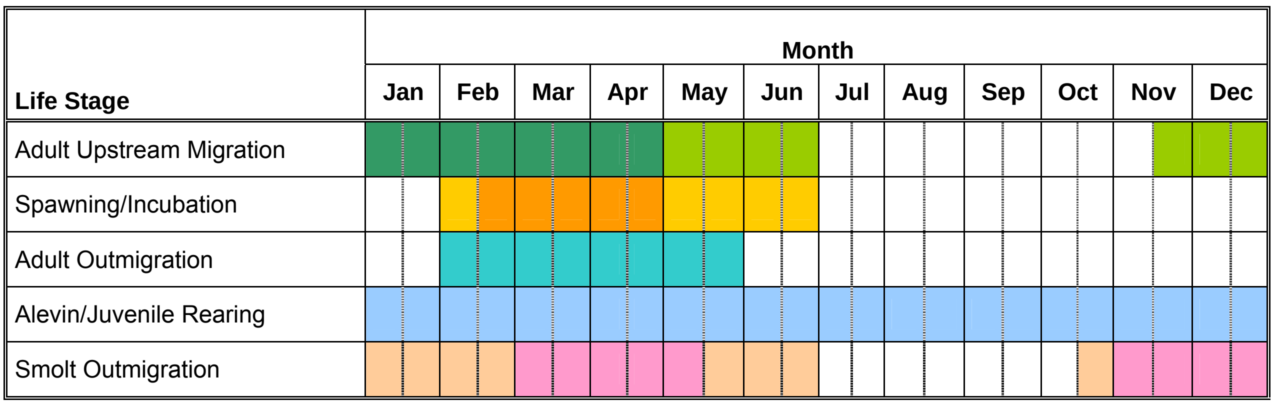
[1] ESUs for west coast steelhead are currently referenced as Distinct Population Segments (DPS). DPS is utilized for the remainder of this EIR/EIS while discussing steelhead populations.

most of the other creeks in this DPS are undocumented but estimated to be in the low hundreds or less compared to counts at SCD that range from the low to high hundreds. The fish counts at SCD do not include steelhead that spawn in the lower Carmel River or its tributaries. Consequently, the Carmel River supports an important population component of the SCCC DPS.

4.4.1.4 Steelhead Life Cycle in the Carmel River

Steelhead are anadromous fish; adults living in the ocean migrate to freshwater for spawning (Barnhart, 1986). Key elements of the steelhead life cycle are tied to the wet and dry seasons and are presented in Figure 4.4-3.

Figure 4.4-3: Occurrence of Steelhead Life Stages in the Carmel River



Darker colors in a single row indicates high activity periods

Spawning and Incubation

In the Carmel River Basin, adults have been observed spawning from February through March, but they probably spawn from mid-January to late April (Dettman and Kelley 1986). The embryos incubate three to eight weeks (longer incubations are associated with lower temperatures) and hatch as alevins in late winter or spring (February through May). The newly hatched alevins reside in the gravel up to two weeks, then emerge as fry and disperse into low velocity areas along stream margins.

Rearing

Steelhead fry grow rapidly through the spring and early summer. Most juvenile steelhead in the Carmel River remain in freshwater for two years before migrating to sea as 8 to 10-inch sized fish. A few individuals may have a freshwater residency of three or four years, as indicated by observations of larger juvenile steelhead in the lower Carmel (Dettman and Kelley 1986) and in nearby Waddell Creek (Shapovalov and Taft 1954). Some steelhead may never go to sea and will mature and spawn in freshwater.

Smolts

Juveniles generally become smolts after they reach about 8 inches in size usually near the end of their second year in freshwater. Smolts migrate downstream during peak periods coincident with large flow events in winter and spring and during the March to May smolt out-migration period. Some smolts may move downstream in all months of year but smolts that don't reach salt water will revert back to their freshwater form as juveniles (called residualized steelhead). These fish may smolt again at some future time when migration conditions to the lagoon or ocean improve. Once in the ocean, smolts will develop into mature adults and return to the river to reproduce one to three years after entering the ocean.

Kelts

Kelts can migrate back downstream and reenter the ocean from February through mid-April. Kelts can also hold over in the river or lagoon until the mouth reopens the following winter. An estimated 15 to 20 percent of adults sampled at the Los Padres fish trap or from anglers were adults that had spawned previously based on a scale analysis collected during the early to mid 1980's (unpublished data, D. Dettman, MPWMD pers. comm. as cited in RDEIR 2000 (Denise Duffy & Associates 2000). The percent of repeat spawners in the Carmel River is relatively consistent with nearby Waddell Creek which had an average of 17.2 percent repeat spawners (15 percent second-time spawners, 2.1 percent third-time and 0.1 percent fourth-time) over a ten-year period (Shapovalov and Taft 1954).

4.4.1.5 Steelhead Trends in the Carmel River

Trends in Adult Abundance

Adult steelhead have been counted in the SCD fish ladder from 1962 to 2005. Adult fish that spawn in the mainstem or tributaries downstream of SCD are not counted. From 1962 to about 1993 ladder counts were made by turning down the flow in the ladder and having an employee of CAW walk along the edge of the ladder and count the fish in the pools. This was done once in the morning and once in the evening and the two counts were added for the daily ladder count. A mechanical counter was used in 1974, 1975, and 1984. An electromechanical counter has been in use since 1994. No evaluation comparing the different counting methods was ever conducted. However, review of data collected by the electromechanical counter suggests that most steelhead move upstream through the ladder during daylight hours and the time it takes to move up the ladder is about 4 to 8 hours, suggesting that the summed twice daily visual counts may be good approximation of the electromechanical counts.

Visual counts could underestimate actual abundance when water is turbid during runoff events or during inclement weather when walking the ladder is particularly dangerous, or if counts were not made on weekends and holidays that were coincident with migration peaks. Visual counts should not be compared directly to total counts tallied by the electromechanical counter.

No counts were made in 1978 to 1983 and 1985 to 1987. Counts of anadromous steelhead for 1976, 1977, and 1988 to 1990 are assumed to be zero since the mouth of the river was not open to the ocean during these winters. During severe or extended droughts, winter flows are absent or inadequate to open the sandbar that closes the mouth between the river and the ocean. During these years, resident trout can move upstream through the ladder.

Adult steelhead runs (as indexed by visual ladder counts at SCD), have ranged from about 300 to 1,400 adults from 1962 to the mid-1970's. Since 1994, total counts at the SCD ladder have ranged from about 300 to 800 adults (Figure 4.4-4). Indices of the runs since the 1976 to 1977 drought have been 30 to 50 percent lower compared to indices made between 1962 and 1975. These reduced numbers are consistent with dramatic physical changes to habitat conditions in the Carmel River through Carmel Valley that occurred during the 1978 floods on the heels of the 1976 to 1977 drought (Kondolf and Curry 1984).

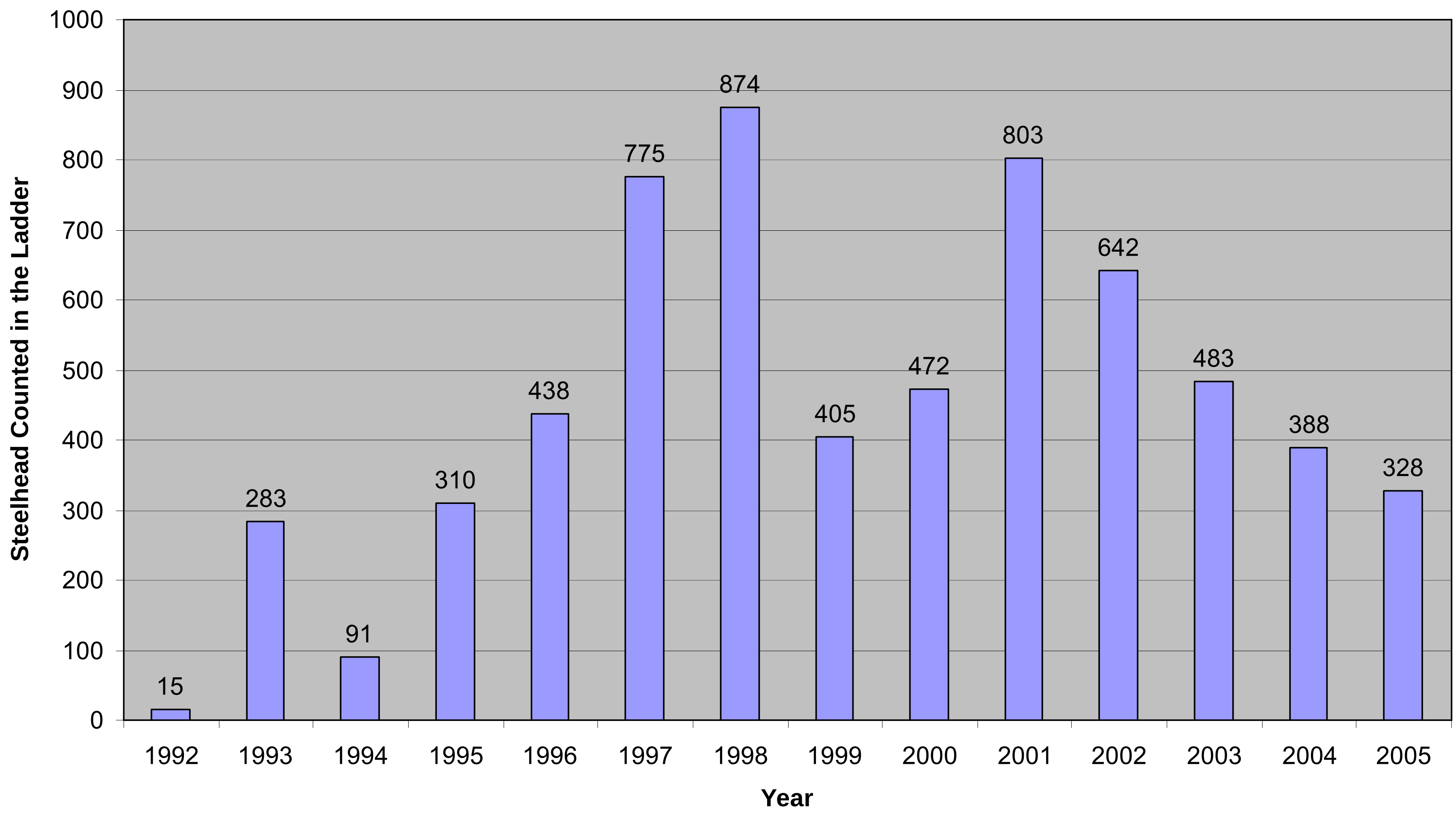
Since the end of the most recent drought in 1991, the run has varied from between 15 to 874 adults. Runs from 1992 to 1994 were recovering following river mouth closure from 1988 to 1990 and very low flow conditions and low juvenile abundance in 1992 and 1994 (Figure 4.4-5). The run increased through 1998, declined to 400 to 500 fish in 1999 and 2000, increased to over 800 fish in 2001 and then declined to about 384 fish in 2005 (Figure 4.4-4).

All adult counts have occurred at SCD located at RM 19.1. The number and proportion of adult steelhead that spawn in the lower river is unknown. A single study estimated that 55 percent of the total run migrated past SCD, but this estimate did not account for potential harvest (at the time) or nondetection of tagged fish between the lower river and the upper river recovery sites (Dettman and Kellog 1986). Data from the LPD trap and truck counts suggest year-to-year high variation in the proportion of the run that passed SCD. Counts at the LPD averaged about 30 percent of the counts at SCD with a range of 10 to 50 percent between 1992 and 2005.

ADULT RUN TIMING

The timing and duration of the run depends on several factors, including the timing and intensity of storms, the type of water year, and the number of fish running in any given migration year. In low flow years with small runs, such as 1992 and 1994, adults entered the river from February through late March. More typically, the majority of adults enter the river from early January through mid-April. In years when storms are early, adults may begin their upstream migration in late November. The first storms of the season and the first opening of the mouth of the river control the initial upstream migration. The end of the migration period depends more on the size of the run, with larger runs extending into May or June.

Figure 4.4-4: Total Adult Steelhead Counts at San Clemente Dam 1992-2005



Source: MPWMD 1998 upstated with from MPWMD wewbsite accessed 18, 2005)

Figure 4.4.5: Timing of Migrations and River Flows (1992 — 2005)

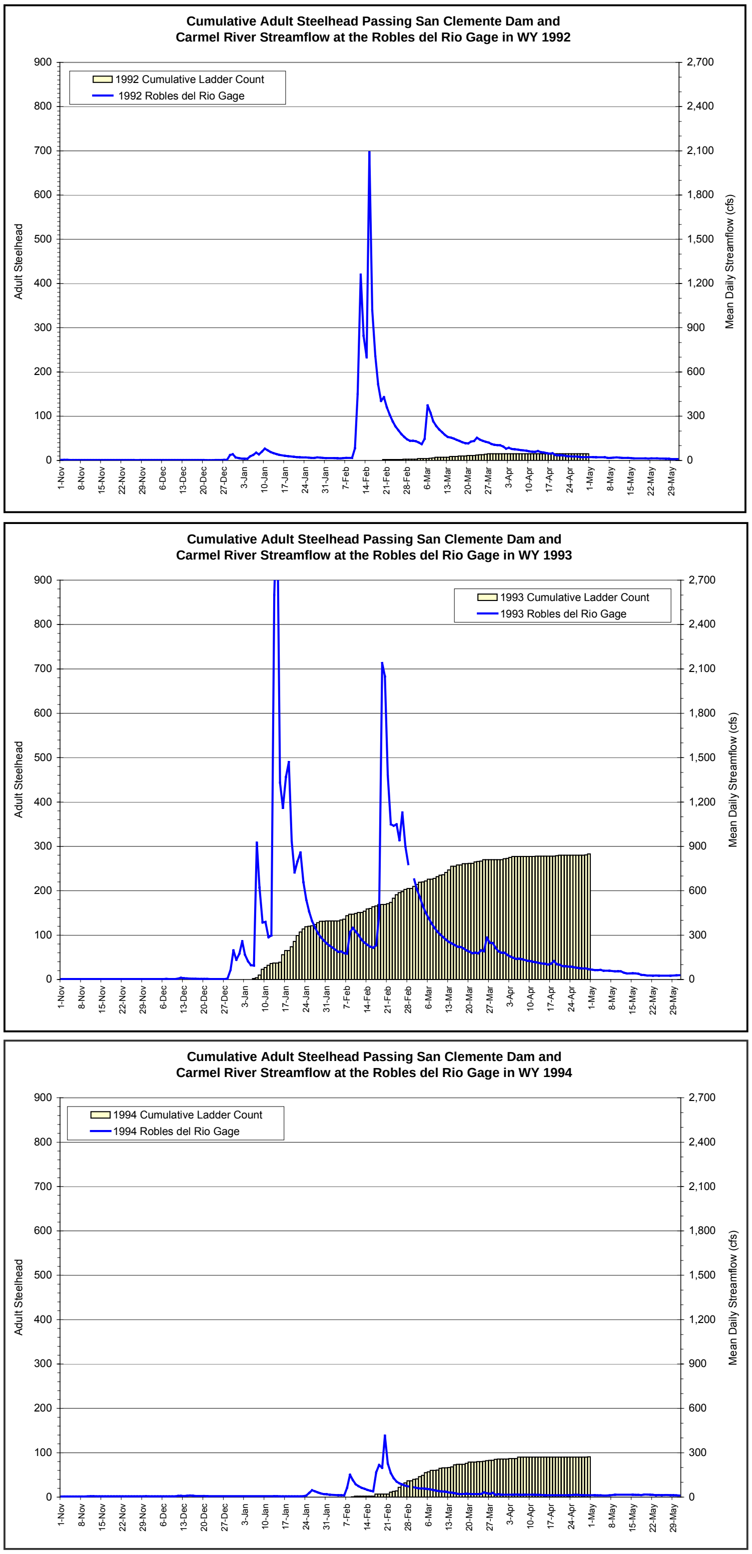
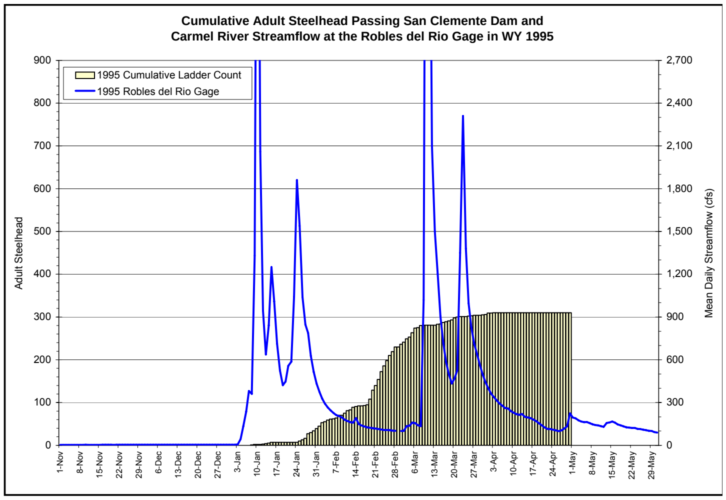
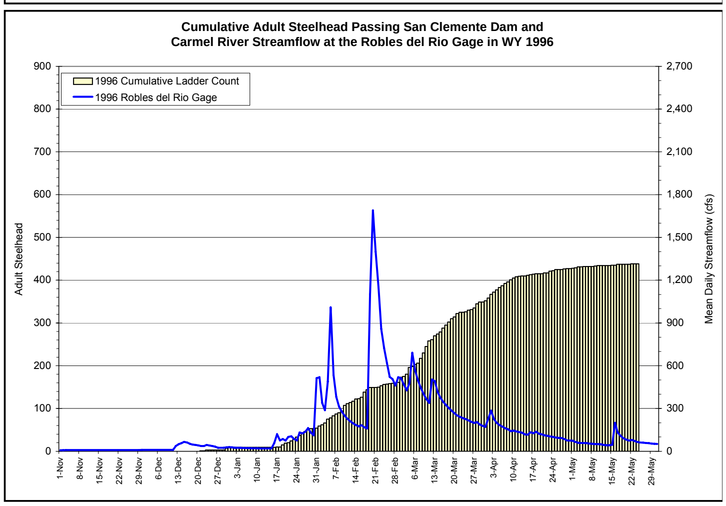


Figure 4.4-5: Timing of Migrations and River Flows (1992 — 2005) continued





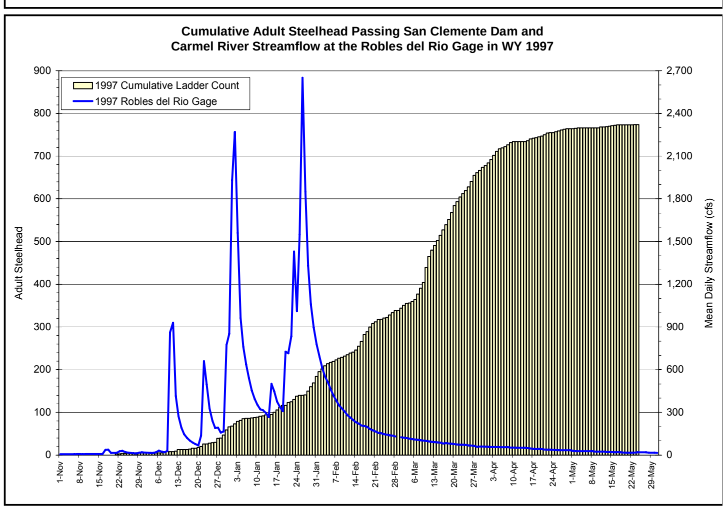
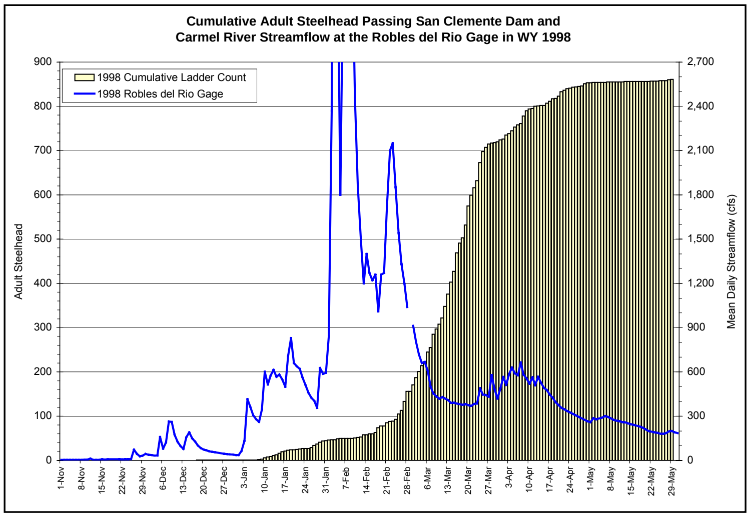
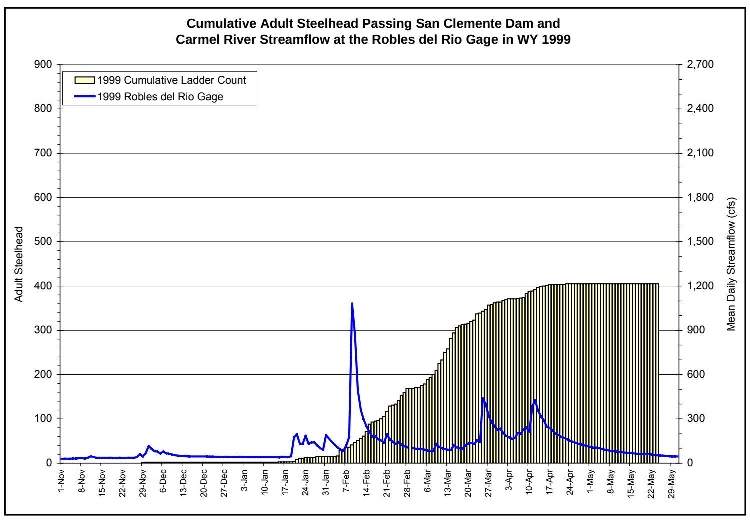


Figure 4.4-5: Timing of Migrations and River Flows (1992 — 2005) continued





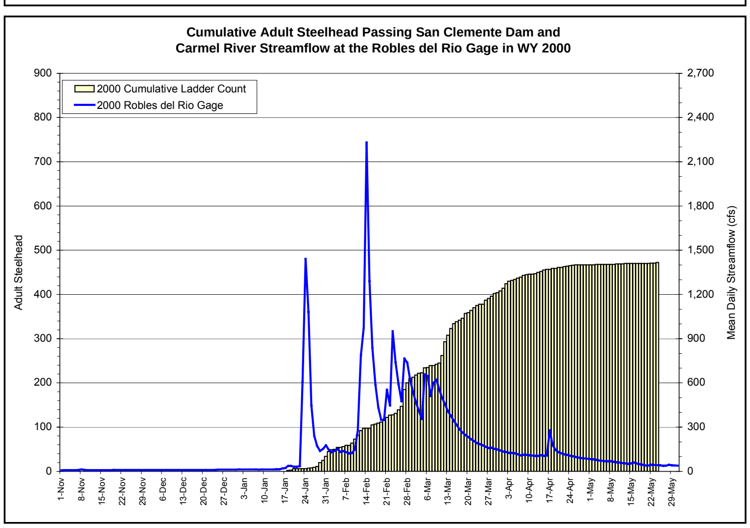
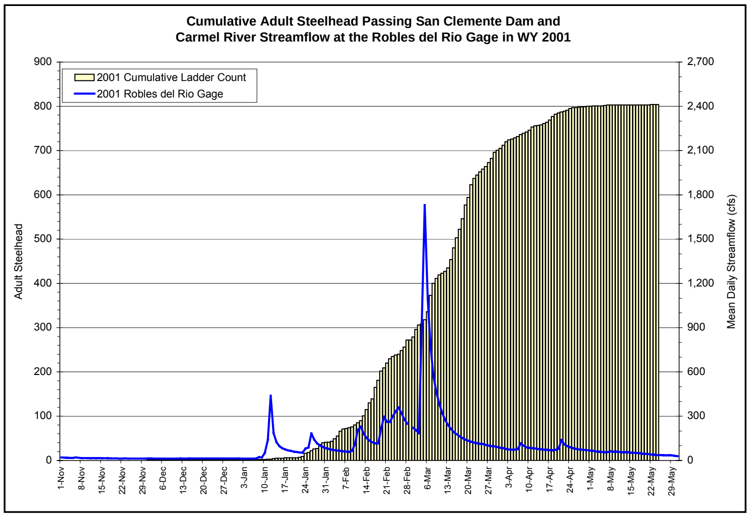
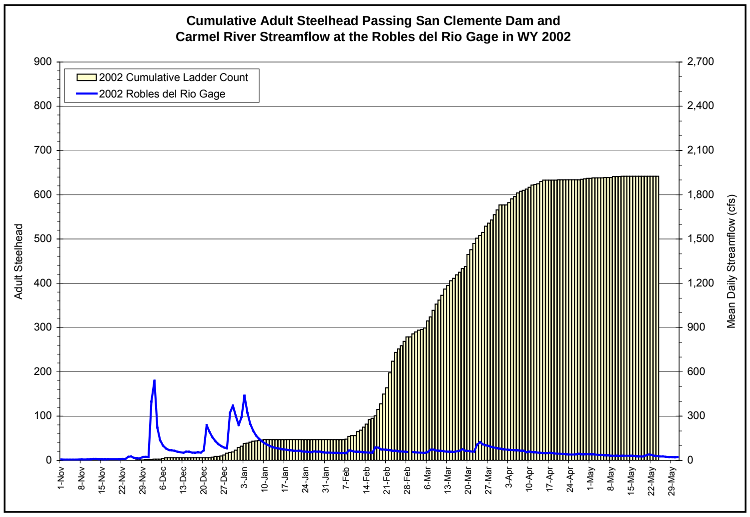


Figure 4.4-5: Timing of Migrations and River Flows (1992 — 2005) continued





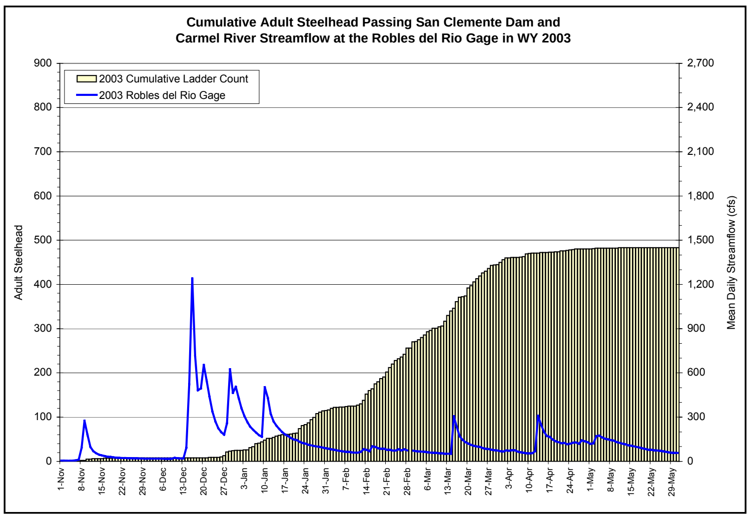
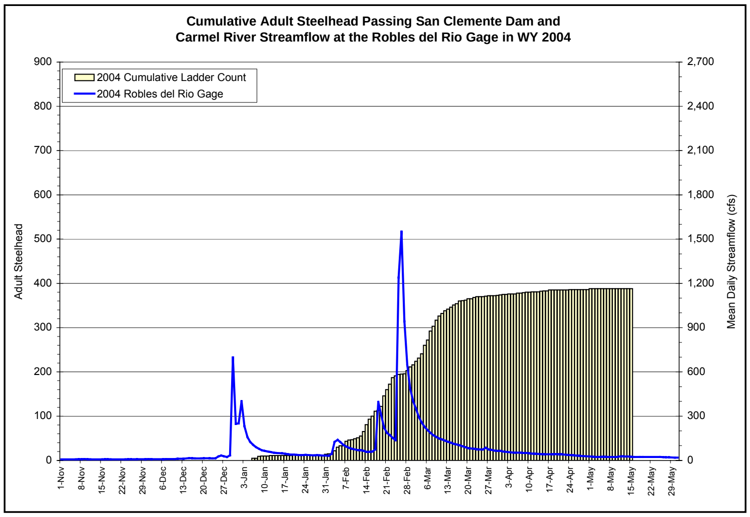


Figure 4.4-5: Timing of Migrations and River Flows (1992 — 2005) continued



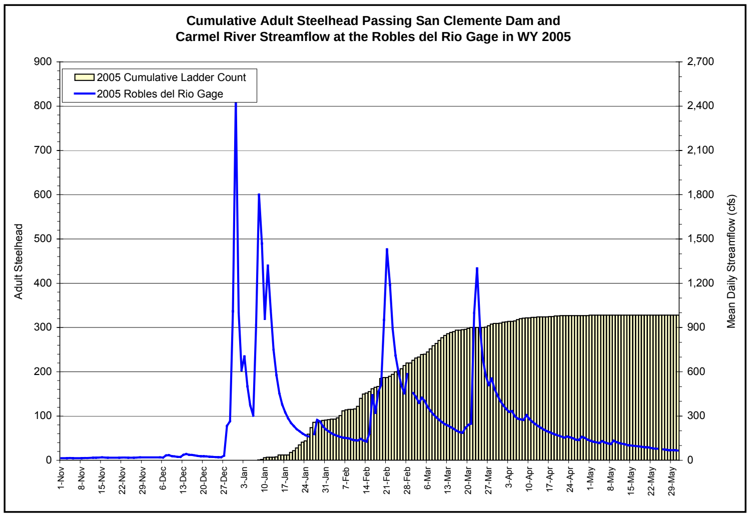


Table 4.4-2 shows biweekly fish counts and percent of the counted run at SCD for 1992 to 2005. Approximately 98 percent of the run as counted at the ladder had occurred between January 1 and April 30 for the 14 years of record. However, operation of the MPWMD fish counter was terminated on April 30 in all years before 1996 at the time flashboards were installed in SCD and the ladder was closed. This was standard operation prior to 1996. The counter has usually been closed down by May 30 most years and a few fish may move upstream after counter operation is suspended in some of the years. The migration appears to mostly over by the end of May and this is supported by a long-term study on a Central California Coastal DPS stream. Shapovalov and Taft (1954) trapped 96 percent of upstream moving adults between December 3 and May 5 for nine years in Waddell Creek, Santa Cruz County and in only one year were adult steelhead counted after May.

At SCD for the 1992 to 2005 counts, note that in most years a few fish probably ran before the counter was activated or after it was shut down and would not have been counted. Therefore the total count is biased slightly low for fish passing SCD. The “percent of the run” in Table 4.4-2 is relative to the number of fish counted at SCD and does not include the few fish that may have moved past the Dam before or after the counter was operating. The “percent of the run” also ignores any of the steelhead that spawn in about 12 miles of the lower river or its tributaries. The timing of the 1992 to 2005 migrations is graphically represented along with river flows in Figure 4.4-5. The same considerations that apply to Table 4.4-2 should be applied to the interpretation of Figure 4.4-5. This document defines the migration season in the Carmel River as January 1 through May 31 (January through May) acknowledging that an early onset of winter storms can advance the start of the migration in some years into late December, and that wet years with large runs can extend the migration season in some years into June.

Trends in Juvenile Abundance

Juvenile steelhead are found throughout the river system year-round including the mainstem river and tributaries that contain year-round surface water. Seasonal tributary streams can support spawning, incubation and early fry rearing into the spring or early summer, but young fish then must move to permanent water.

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Table 4.4-2: Summary of Adult Run Timing for Water Years 1992-2005 Based on Steelhead Counted at San Clemente Dam

	Lagoon Opened		Nov-1 to Nov-15	Nov-16 to Nov-30	Dec-1 to Dec-15	Dec-16 to Dec-31	Jan 1 to Jan 15	Jan-16 to Jan-31	Feb-1 to Feb-14	Feb-15 to Feb-28(29)	Mar-1 to Mar-15	Mar-16 to Mar-31	Apr-1 to Apr-15	Apr-16 to Apr-30	May-1 to May-15	May-16 to May-31	Jun-1 to Jun-15	Jun-15 to Jun-30	TOTAL
WY 1992	11-Feb	Fish	*Fish Counter Started 1/1*				0	0	0	3	6	6	0	0	*Ladder Closed 4/30*				15
		% Run					0.0%	0.0%	0.0%	20.0%	40.0%	40.0%	0.0%	0.0%					
WY 1993	3-Jan	Fish	*Fish Counter Started 1/1*				39	93	27	46	50	15	8	5	*Ladder Closed 4/30*				283
		% Run					13.8%	32.9%	9.5%	16.3%	17.7%	5.3%	2.8%	1.8%					
WY 1994	17-Feb	Fish	*Fish Counter Started 2/1*						2	35	36	13	4	1	*Ladder Closed 4/30*				91
		% Run							2.2%	38.5%	39.6%	14.3%	4.4%	1.1%					
WY 1995	9-Jan	Fish	*Fish Counter Started 1/3*				7	32	52	139	54	22	4	0	*Ladder Closed 4/30*				310
		% Run					2.3%	10.3%	16.8%	44.8%	17.4%	7.1%	1.3%	0.0%					
WY 1996	13-Dec	Fish	*Fish Counter Started 11/27*		0	8	1	45	68	39	118	73	59	16	8	3	*Counter Stopped 5/24*		438
		% Run			0.0%	1.8%	0.2%	10.3%	15.5%	8.9%	26.9%	16.7%	13.5%	3.7%	1.8%	0.7%			
WY 1997	6-Dec	Fish	*Started 11/14*	5	8	53	29	89	62	92	177	163	58	28	7	4	*Counter Stopped 5/24*		775
		% Run		0.6%	1.0%	6.8%	3.7%	11.5%	8.0%	11.9%	22.8%	21.0%	7.5%	3.6%	0.9%	0.5%			
WY 1998	3-Jan	Fish	*Fish Counter Started 12/2*		0	1	15	29	13	98	271	297	78	51	3	5	5	8	874
		% Run			0.0%	0.1%	1.7%	3.3%	1.5%	11.2%	31.0%	34.0%	8.9%	5.8%	0.3%	0.6%	0.6%	0.9%	
WY 1999	3-Nov	Fish	*Started 11/28*	2	0	0	1	12	56	98	125	70	36	5	0	0	*Counter Stopped 5/24*		405
		% Run		0.5%	0.0%	0.0%	0.2%	3.0%	13.8%	24.2%	30.9%	17.3%	8.9%	1.2%	0.0%	0.0%			
WY 2000	23-Jan	Fish	*Fish Counter Started 12/8*		0	0	0	34	63	113	124	74	47	12	3	2	*Counter Stopped 5/24*		472
		% Run			0.0%	0.0%	0.0%	7.2%	13.3%	23.9%	26.3%	15.7%	10.0%	2.5%	0.6%	0.4%			
WY 2001	11-Jan	Fish	*Started 11/28*	0	2	0	3	36	74	157	208	225	56	39	3	1	*Counter Stopped 5/24*		804
		% Run		0.0%	0.2%	0.0%	0.4%	4.5%	9.2%	19.5%	25.9%	28.0%	7.0%	4.9%	0.4%	0.1%			
WY 2002	3-Dec	Fish	*Started 11/1*	2	4	17	24	0	35	197	132	166	56	4	5	0	*Counter Stopped 5/24*		642
		% Run		0.3%	0.6%	2.6%	3.7%	0.0%	5.5%	30.7%	20.6%	25.9%	8.7%	0.6%	0.8%	0.0%			
WY 2003	15-Dec	Fish	6	2	0	17	34	56	37	104	90	104	22	8	3	0	*Counter Stopped 5/31*		483
		% Run	1.2%	0.4%	0.0%	3.5%	7.0%	11.6%	7.7%	21.5%	18.6%	21.5%	4.6%	1.7%	0.6%	0.0%			
WY 2004	30-Dec	Fish	*Fish Counter Started 1/1*				11	3	67	130	140	23	9	3	2	*Counter Stopped 5/5*			388
		% Run					2.8%	0.8%	17.3%	33.5%	36.1%	5.9%	2.3%	0.8%	0.5%				
WY 2005	30-Dec	Fish	*Fish Counter Started 1/1*				12	79	61	68	71	19	14	3	1	0	*Counter Stopped 5/31*		328
		% Run					3.7%	24.1%	18.6%	20.7%	21.6%	5.8%	4.3%	0.9%	0.3%	0.0%			
AVERAGE		Fish	0.4	0.8	1.0	6.9	12.6	36.3	44.1	94.2	114.4	90.7	32.2	12.5	2.5	1.1	0.4	0.6	450.6
		% Run	0.1%	0.1%	0.1%	1.1%	2.8%	8.5%	9.9%	23.3%	26.8%	18.5%	6.0%	2.0%	0.5%	0.2%	0.0%	0.1%	

Juvenile population data were collected sporadically in the Carmel River system prior to 1990. In 1973 and 1974 juvenile abundance data primarily was collected upstream of SCD because limited surface flows in the lower river provided only about 10 percent of the available rearing habitat for the entire river. A few efforts to collect juvenile abundance data occurred during the 1980s. Since 1990, MPWMD has been collecting annual juvenile abundance data in the Carmel River, eventually establishing eight stations in the 15 miles between Robinson Canyon Road Bridge and LPD. In 2002, two sampling sites were added in Reach 3 upstream of SCD. Table 4.4-3 displays juvenile steelhead densities (in number of steelhead per foot of channel) for each reach. The table shows average densities (in number of fish per foot of channel and fish per mile) for each year from 1994 to 2004 in the right two columns and by reach in the lower two rows.

Estimates of juvenile steelhead abundance in the mainstem Carmel River downstream of LPD is estimated by multiplying the steelhead reach density by the length of the reach (in feet) and summing the reaches. Reach 9 goes dry in most years and does not support any rearing, except for the lagoon, which can support thousands of steelhead but is not included in the comparison because there are no long-term data. Reach 8 dries back in most years and abundance estimates are based on its minimum estimated flowing length for each year (refer to Figures 4.4-1 and 4.4-2 and Table 4.4-1 for Reach locations and descriptions). The same approach is used in years when dry back extends into Reach 7 (in years when Reach 8 goes completely dry it supports no fish and abundance for Reach 7 would be based on its minimum flowing length).

Juvenile abundance by reach and year for the mainstem Carmel River downstream of LPD is shown in Figure 4.4-6, these data show the relatively low abundance during the end of the drought from 1990 to 1992 then a relatively consistent level of abundance between 1993 and 1999 and in 2001, 2002 and, 2004 ranging from about 50,000 to 100,000 juveniles. Juvenile abundance increased in 2000 to over 170,000 juveniles and in 2003 to over 120,000 juveniles. No consistent sampling has occurred upstream of LPD.

Table 4.4-4 shows average densities of juvenile steelhead collected during late summer or fall from sites in the Carmel River for the years 1973 to1974, 1983, 1985 to 1987, and from 1990 to 2004. Data obtained before 1983 includes mainstem and tributary sites as well as sites in the Carmel River upstream of Los Padres Reservoir. Data since 1990 has been collected from the mainstem Carmel River from LPD downstream. These data sets show that average fish densities for years when sites were sampled upstream of LPD in 1973 and 1974 in the Carmel River and from only lower river sites in 1983 and 1985 to 1987 are comparable to the lower river sites for the years 1990 to 2004 compared to the much lower densities that occurred during the 1987 to 1992 drought.

Table 4.4-3: Carmel River Juvenile Steelhead Density 1990-2004 by River Reach[1]

Lineal Population Density at Survey Stations (numbers per foot of stream)[3, 4]															
	Lower River Sites	Scarlett Narrows	Garland Park	Boronda	DeDamp. Park	Stonepine Resort	Sleepy Hollow	SCR Delta Lower Station	SCR Delta Upper Station	Los Compadres	Cachagua	**Overall Annual Average**		**Average[2] 1994-on Comparison**	
YEAR	RM 5.8	RM 8.7	RM 10.8	RM 12.7	RM 13.7	RM 15.8	RM 17.5	RM 19.0	RM 19.6	RM 20.7	RM 24.7	**(nos./ft)**	**(nos./mi)**	**(nos./ft)**	**(nos./mi)**
1990	0	0	0	0	0	0.50	0.27			0.26	0.22	**0.14**	**733**	--	--
1991	0	0	ND	0.12	0	0.74	0.39			0.09	0.62	**0.25**	**1,294**	--	--
1992	ND	ND	0.67	0.36	ND	0.96	0.30			0.40	0.83	**0.59**	**3,098**	--	--
1993	ND	0.62	0.91	0.92	0.82	0.84	0.52			1.22	1.84	**0.96**	**5,075**	**0.96**	**5,075**
1994	ND	0.44	0.23	0.43	0	0.50	0.29			1.51	0.71	**0.51**	**2,713**	**0.51**	**2,713**
1995	0.49	0.65	1.01	1.61	ND	1.42	0.69			0.50	1.63	**1.00**	**5,281**	**1.07**	**5,666**
1996	0.24	1.52	0.82	1.05	2.03	1.22	0.29			0.95	1.92	**1.12**	**5,890**	**1.23**	**6,468**
1997	0.02	0.22	1.02	1.74	1.15	0.5	0.22			1.15	1.41	**0.83**	**4,359**	**0.93**	**4,891**
1998	0.19	0.30	0.67	0.34	1.50	0.27	0.60			0.54	2.24	**0.74**	**3,901**	**0.81**	**4,264**
1999	0.17	0.26	0.50	0.32	0.62	1.67	0.45			0.46	1.35	**0.64**	**3,403**	**0.70**	**3,716**
2000	0.91	1.03	0.64	1.38	5.66	1.71	1.46			1.41	2.3	**1.83**	**9,680**	**1.95**	**10,289**
2001	ND	0.48	0.35	0.63	0.68	1.08	0.32			0.47	1.62	**0.70**	**3,716**	**0.70**	**3,716**
2002	ND	0.68	0.85	1.67	0.83	1.07	0.5	0.33	0.68	1.52	2.73	**1.09**	**5,734**	**1.09**	**5,734**
2003	1.53	0.82	2.16	1.86	1.45	1.55	1.23	0.58	1.09	1.69	2.16	**1.47**	**7,738**	**1.46**	**7,704**
2004	0.25	0.46	0.78	1.21	0.43	1.24	0.55	0.58	0.41	0.45	0.89	**0.66**	**3,480**	**0.70**	**3,696**
Station Ave (no./ft)	**0.38**	**0.53**	**0.76**	**0.91**	**1.17**	**1.02**	**0.54**	**0.50**	**0.73**	**0.84**	**1.50**	**0.83**	**4,406**	**1.01**	**5,328**
Station Ave (no./mile)	**2,006**	**2,822**	**4,001**	**4,801**	**6,161**	**5,375**	**2,844**	**2,622**	**3,837**	**4,442**	**7,909**				
Overall Station Averages:												**0.81**	**4,257**		

Notes:

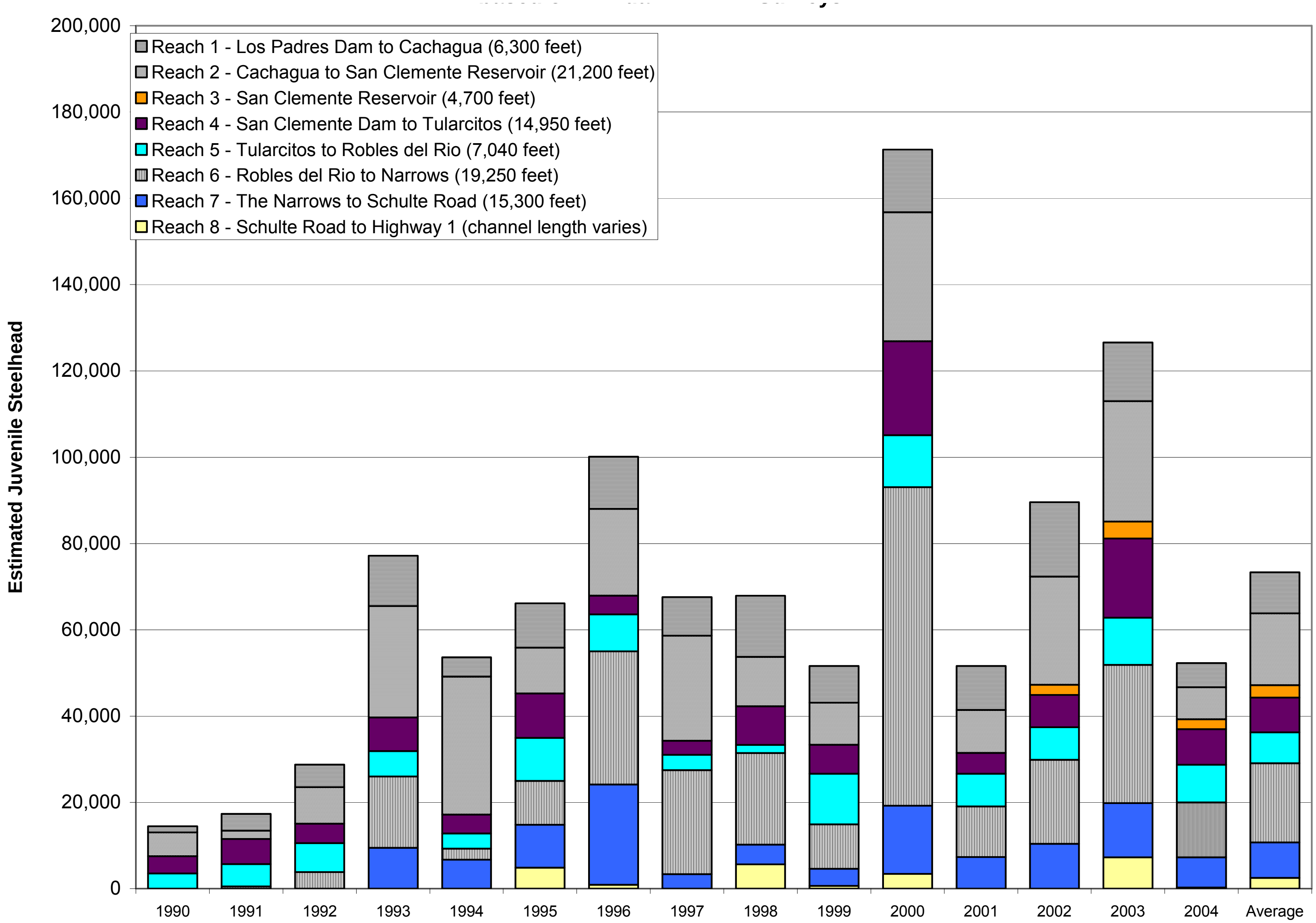
[1] Surveys completed in October and results based on repetitive 3-pass removal method using an electrofisher.
[2] Average 1994-on comparison does not include data for lowest river sites at Meadows Road (1995); Schulte Area (1996), and Red Rock Area (1997-2003).
[3] RM; indicates site location in miles from river mouth.
[4] ND means No Data was collected, A "0" indicates stream was dry at sampling station, no entry means that the site was not part of the sampling program..

Table 4.4-4: Carmel River Juvenile Steelhead Population Density 1973-2004

Year	No./foot	No./mile
1973	1.16	6,121
1974	0.69	3,648
1983	1.16	6,116
1984		
1985	0.94	4,966
1986	1.77	9,307
1987	0.97	5,107
1988		
1989	0.00	22
1990	0.14	733
1991	0.25	1,294
1992	0.59	3,098
1993	0.96	5,075
1994	0.51	2,713
1995	1.00	5,281
1996	1.12	5,890
1997	0.83	4,359
1998	0.74	3,901
1999	0.64	3,403
2000	1.83	9,680
2001	0.70	3,716
2002	1.09	5,734
2003	1.47	7,738
2004	0.66	3,480
Averages		
1973,74,83,85-87	1.12	5,878
1989-1991	0.13	683
1992-2004	0.93	4,928

Source: Snider 1983 (1973-1974), CDFG (83, 85-87), MPWMD (1990-2004)

Figure 4.4-6: Carmel River Juvenile Steelhead Density in the Carmel River Downstream of Los Padres Dam (LPD) from 1990-2003



4.4.1.6 Distribution of Habitat

Spawning

In most years an estimated 61.5 miles of channel (mainstem and tributaries) provide spawning habitat in the Carmel River system, including approximately 40.5 miles upstream of SCD and 21.0 miles downstream. Spawning habitat distribution in the mainstem Carmel River is presented in Table 4.4-5. According to Dettman (1990) slightly more than half of the potential spawning habitat occurs upstream of SCD. Total area of spawning habitat in the 25.3 miles of the mainstem is estimated at 120,000 square feet. Of that total, the estimated amount of spawning habitat upstream of SCD in the mainstem is 70,800 square feet (59 percent) compared to 49,200 square feet downstream of SCD (41 percent).

Table 4.4-5: Spawning Habitat Distribution Estimated within the Carmel River Mainstem Upstream and Downstream of San Clemente Dam

	Upstream	Downstream	Total
Square Feet	70,800	49,200	120,000
Percent	59%	41%	-

Rearing Habitat

Summer rearing habitat for juveniles is believed to be the most critical limiting factor for juvenile steelhead production in the Carmel River Basin. Almost three-quarters of the potential summer rearing habitat occurs upstream of SCD (Table 4.4-6), and varies depending upon the type of water year. Each dry season, depending on the amount of winter rainfall and pumping volume from the Carmel Valley Aquifer, the river downstream of Robles del Rio can dry back from one mile upstream of the mouth up to 5 to 8 miles, causing a loss of rearing habitat. During times when the river begins drying back, juvenile steelhead are rescued from the drying reaches and tributaries by the MPWMD and volunteers from the Carmel River Steelhead Association. Rescued fish are taken to the Sleepy Hollow Steelhead Rearing Facility (SHSRF) or released into permanently flowing sections of the Carmel River.

Table 4.4-6: Rearing Habitat Index for the Carmel River Watershed*

		Young-of-the Year (0+)		1 + and Older Fish	
Portion of the Watershed	**Reaches**	**Total Rearing Index Units****	**Percent Watershed Rearing**	**Total Rearing Index Units****	**Percent Watershed Rearing**
Upper	0	3.8 million	39%	2.5 million	57%
Middle	1,2	3.2 million	33%	0.8 million	20%
Lower	4,5,6	2.7 million	28%	1.0 million	23%
Total		9.7 million		4.4 million	

Notes:

Watershed delineation as noted by MPWMD 1998. Reaches 3, 7, 8, & 9 not sampled by MPWMD nor included in analysis. San Clemente Dam divides the middle and lower watersheds

10* Total rearing index units are a measure of rearing index per foot multiplied by the length of the section

*Based on a rearing index presented in (Dettman 1990)

During most water years (aside from critically dry and dry years) approximately 49 miles of channel support habitat for juvenile rearing, including 36 miles upstream of the SCD and 13 miles downstream (Table 4.4-6). A “Rearing Habitat Index” (RHI) model was developed for the mainstem Carmel River (Dettman and Kelley 1986, Dettman 1990) as a method to assess the quality and quantity of rearing habitat available in the river. Dettman divided the river into upper, middle, and lower sections and evaluated rearing habitat for 0+ and 1+ steelhead. The RHI model shows about 72 percent of Age 0+ and 77 percent of Age 1+ and older rearing habitat is located in the mainstem Carmel River upstream of SCD (Table 4.4-6). About 33 percent of Age 0+ and 20 percent of Age 1+ and older rearing habitat is located between SCD and LPD. About 28 percent of Age 0+ and 23 percent of Age 1+ and older rearing habitat is located downstream of SCD (Table 4.4-6).

4.4.1.7 Sleepy Hollow Steelhead Rearing Facility

The Carmel River does not maintain surface flows through most summers in a nine-mile reach downstream of the Scarlett Narrows and in some years, a 1.8-mile reach upstream of the Narrows. As part of the steelhead mitigation program, the MPWMD has rescued juvenile steelhead from drying reaches since 1991. Following the 1987 to 1992 drought, steelhead production has increased in the Carmel River drainage and less rearing habitat is available in the lower river for rescued fish. The Sleepy Hollow Steelhead Rearing Facility (SHSRF) accommodates any rescued fish that are not transplanted and reared in the river.

The SHSRF was constructed one mile downstream of SCD as mitigation for project operations on the Carmel River in order to meet the increased demand of summer rescues for rearing juvenile steelhead through the dry season.

In early 1997 the District completed construction of the SHSRF, which includes a diversion and pump station, three large circular tanks, an 800-foot long rearing channel, electrical, water, pressurized air and drainage systems, a combination office-shop-lab building and miscellaneous equipment. The water diversion facility includes a screened intake, located in a large pool adjacent to the facility. Approximately 250 feet of 6-inch-diameter PVC pipe delivers up to 1 cfs of river water to the holding tanks and supplemental rearing channel. The channel and tanks are sized to hold and rear a maximum of 64,000 wild Ages 0+ and 1+ steelhead. The fish are allowed to emigrate out of the rearing facility during the fall and winter period when flows increase available habitat in the river (Hanna and Dettman 1993).

Two alternative sources of water serve as a backup supply for the river diversion. A 4-inch pipeline connects to CAW’s 24-inch diversion pipeline that supplies the Carmel Valley Filter Plant (CVFP) and is used as back up in case of a power failure. This would occur if the main intake is damaged or needs servicing or if flow in the river is too high during the fall/winter period. A second backup system with a five horsepower pump can draw water directly from the river in case of other emergencies (Hanna and Dettman 1993).

The survival rate for juvenile fish at SHSRF after construction was lower than expected (less than 15 percent) due to warm river water temperatures and the resulting infectious diseases caused by *Ichthyothirius* and *Flexibacter columnari* outbreaks and mortalities. In October 2000, a new cooling tower, new pumps, an emergency generator, and electrical panels were installed to reduce water temperatures and disease problems and decrease the mortality rate. Water temperature goals at the SHSRF are:

- Maximum daily water temperature should be 70 °F; and
- Mean daily water temperature should not exceed 65 °F.

An automated alarm system was installed in June 2001 and upgraded in 2002 to monitor power supply, pumps, water depth, water flow, temperature, and pressure. The system automatically calls MPMWD staff when problems occur to the water or power supply.

SHSRF was out of service during the 2002 rescue season because of damage to the two river pumps. Sand and fine silt abrasion in the pump housing damaged the seals and impellers in the pumps. One pump was overhauled while the other was replaced. A sand and silt separator was installed to prevent damage to river pumps. In anticipation of additional sediment problems during the DSOD-required Interim Seismic Safety Measures spring/summer SCD drawdowns, MPWMD retrofitted the SHSRF intake structure. The intake pumps were upgraded and an additional backup pump and portable pump was purchased prior to the 2003 fish rescue season.

Juvenile steelhead survival rates for SHSRF were greater than 40 percent for the 2003 and 2004 rescue seasons and were estimated to be near 50 percent for the 2005 rescue season. The number of fish released from SHSRF included up to 12,500 juvenile steelhead for the 2003 and 2005 rescue seasons (MPWMD 2003b and 2006).

4.4.1.8 Fish Passage at SCD

Steelhead passage at SCD is predicated by a series of events that happen in sequence each year. Similar to many other coastal streams from the Navarro River in the north to the Ventura River or Malibu Creek in the south with bar-built lagoons, the Carmel River is only seasonally connected with the ocean. Before adult steelhead can enter the river for spawning, the mouth of the river has to connect with the ocean. The hydrologic connection is initiated by runoff from winter storms.

In the Carmel River, flows into the lagoon must increase to about 200 cfs to fill the lagoon and breach the bar to open the mouth. Opening of the barrier beach at the mouth is managed by the Monterey County Water Resources Agency under a BO issued by NMFS to avoid flooding low lying homes. The protocols require certain conditions to be met prior to artificially opening the lagoon instead of allowing it to overtop the barrier beach without intervention. These protocols combine the use of river flow at the Near Carmel Gage with lagoon water levels to determine when or whether to artificially breach the bar.

In order for the river to establish surface flow at the Near Carmel Gage however, the following sequence of events must occur after rainfall begins in the watershed: 1) Los Padres Reservoir must first fill and spill, providing flows from the upper watershed; 2) San Clemente Reservoir must fill and spill; 3) the aquifers in the Carmel Valley that are pumped for water supply during the summer and are depleted by fall must recharge before surface flow is restored through the Carmel Valley and connects with the lagoon; and 4) a storm event that generates about a 200 cfs flow into the lagoon must occur.

Access from the ocean to the Carmel River is normally established by mid February (Table 4.4-7). Along with a hydrologic connection of the river and the ocean, there is a seasonal component to the steelhead migration. Steelhead generally migrate from December to May and sometimes June in the Carmel River. A summary of the 1992 to 2006 steelhead migration and river opening timing is provided in Table 4.4-7. For three years prior to 1992 the river mouth remained closed during the drought years of 1988 through 1990 and it opened only briefly in 1991. Records on the timing of the river mouth openings prior to 1988 are incomplete and this period was not included in the table. The mouth must remain open for migration into the river to be sustained. The mouth may close if flows drop to less than 20 cfs at the Near Carmel gage. For adult steelhead to successfully move upstream though the Carmel Valley, flows of between 45 to 75 cfs must be sustained for fish to pass the most shallow (critical) riffles.

If the above conditions are met and sustained during the migration season, steelhead would enter the river and begin arriving at the base of SCD.

Adult Migration

In some years the upstream adult migration begins as early as mid-December (Table 4.4-7). The steelhead migration can extend through April into May or even June in some years. A consistent period of high activity occurred during a six-week period from late February through March for the 15 years of record, when about 66 percent of the steelhead passed through the ladder. For the 15 years of record, steelhead have migrated upstream as early as late November (in one year out of 15) when the mouth opened early, and as late as June (1 year out of 15) when the ladder was still operating. The late migration occurred in 1998 following a very wet winter and spring that coincided with a relatively large adult run (over 800 fish). In most years of record, the ladder was closed or the counter removed by the end of May so there may have been other years when fish movement occurred in June but was not documented. Local climate conditions during these years played a key role in the timing of the early and late upstream migrations. Early migration can occur when storms open the river mouth earlier than usual. Late migrations have occurred in years when late spring or early summer flows are still very high. During this 15-year period, early and late migrations have not occurred within the same year.

Table 4.4-7: Fifteen Year Summary of Adult Steelhead Counted in Semi-monthly Periods at San Clemente Dam Showing Timing of River Mouth Opening and Migration in the Carmel River 1992-2006

Semi-monthly Period	1992-2006 Total No. of Steelhead* Counted for Period	Percent of Total Steelhead Migration for Period	No. of Years Steelhead Counted in Ladder for Period	No. of Years Mouth First Opened ** in this Period	No. of Years Counting Stopped or Ladder Closed in this Period
Nov-1 to Nov-15	0	0.0%	0	1	
Nov-16 to Nov-30	2	0.0%	1	0	
Dec-1 to Dec-15	12	0.2%	1	5	
Dec-16 to Dec-31	99	1.5%	5	3	
Jan 1 to Jan 15	198	3.0%	9	3	
Jan-16 to Jan-31	546	8.2%	11	1	
Feb-1 to Feb-14	653	9.8%	13	1	
Feb-15 to Feb-28/29	1,348	20.3%	15	1	
Mar-1 to Mar-15	1,717	25.8%	15		
Mar-16 to Mar-31	1,335	20.1%	15		
Apr-1 to Apr-15	486	7.3%	13		
Apr-16 to Apr-30	186	2.8%	9		4
May-1 to May-15	36	0.5%	6		1
May-16 to May-31	15	0.2%	4		9
Jun-1 to Jun-15	5	0.1%	1		
Jun-15 to Jun-30	8	0.1%	1		1
Total	6,646			15	15

Fish counted in the SCD ladder prior to the lagoon opening were removed from the total

* Migration Year is fall/winter period of Year-1 and winter/spring period of Migration Year (MY). (Example MY 1992 is from Nov 1991 to Jun 1992)

* * Mouth of River opened one year out of 15 in Nov 1-15 Period, Mouth was open the same year for Nov 16-30 period. For this set of years, mouth was always open by Late February.

In summary, the seasonal hydrology is an important factor that greatly influences the beginning and end of the migration season. However, in spite of the hydrology, in most years the peak migration occurs between mid February and the end of March, during which about two-thirds of the run is counted at SCD with about more than 90 percent of the run counted at SCD between mid January and the end of April (Table 4.4-7). When flows are not capable of sustaining passage, or when there are no more steelhead waiting in the ocean to enter the river, the migration for that year is essentially over, even if the migration season has not ended. Conditions to support migration end when the river flow through the valley falls below 45 cfs and access to the lagoon is no longer possible when the bar closes which normally happens when flow at the Near Carmel River gage falls below 20 cfs. In some years conditions suitable for upstream migration continue to persist long after the last fish has been counted in the ladder.

Juvenile Migration

Juvenile steelhead can move downstream year-round but peak periods of movement occur during the initial runoff of the wet season and then again in March through May (Shapovalov and Taft 1954). Adults that have spawned in the upper watershed can return to the ocean and become repeat spawners in future years. Adult and juvenile downstream passage is not as constrained as upstream passage by depth of flow, but the mouth must be open for adults (and smolts) to move into the ocean. If the mouth is not open, smolts and adults may reside in the lagoon during the summer and complete their migration the following fall or winter when the mouth does open. Smolts feed on the abundant invertebrate fauna in the lagoon and can grow rapidly as long as dissolved oxygen levels remain suitable and lagoon depth is not compromised. Lagoon habitat is dependent upon inflow. During dry years when inflow is low, water levels drop and fish are exposed to poor water quality conditions (warm temperatures and low DO levels). Poor water quality can force fish toward the surface where oxygen levels are better but in the process expose fish to predation by gulls and other birds. Lagoon residency is not a good option for adults since they do not feed while in freshwater and water quality conditions in the lagoon can be poor during the summer and fall.

Description of the Existing Fish Ladder

Passage of fish from the lower river to upstream of the Dam is currently accomplished with a pool and weir fish ladder with an entrance at the plunge pool below the Dam and exit at the upper end of the ladder into the reservoir on the San Clemente Creek (west) side of the Dam. The existing ladder has 28 pools and rises some 68 feet from the river to the reservoir. While the average step between pools is a little more than 2 feet, some steps in the ladder range up to about three feet. Passage into the reservoir is through the Dam via an 18-inch high by 24-inch tunnel with a floor elevation of 524.5 feet (or 0.5-foot lower than the present spillway elevation of 525 feet above MSL). The ladder has three resting pools and can operate at flows of between 10 and 2 cfs. Flow is regulated by adjusting the slide gate on the upstream side of the Dam. Ladder walls are not high enough above the water level in the ladder to prevent fish from jumping out of the ladder. Metal screen fencing has been installed along the upper walls to contain jumping fish and keep them from leaping out of the ladder.

Prior to 1997, flashboards were installed in SCD at the end of April to surcharge the reservoir and increase storage. At the time flashboards were installed, the fish ladder was closed. Surcharging the reservoir stopped after the 1996 season because much of the inundated area was so shallow it increased summer water temperatures, thereby increasing water temperatures in the river downstream of the Dam and creating disease problems in the temporary fish rearing tanks at Sleepy Hollow.

The existing ladder does not meet current standards for fish passage conditions promulgated by either NMFS or CDFG. The new ladder would have a maximum of one foot steps between pools, greater freeboard, adequate pool volume, greater attraction flows and will provide for upstream fish to swim from one pool to the next instead of jumping as in the present ladder.

After exiting the fish ladder into San Clemente Reservoir, steelhead swim through the reservoir into the Carmel River or San Clemente Creek and continue upstream migration.

4.4.1.9 2030 Baseline Conditions

San Clemente Reservoir, San Clemente Creek, and the Carmel River would continue to change through time and so an extended environmental baseline setting through the year 2030 is used in this analysis. The 2030 Baseline incorporates the changes that are expected to occur over the 25 years from initiation of the EIR/EIS to provide a more comprehensive analysis and evaluate trends and changes that may occur to existing conditions.

One of the major changes that could affect aquatic resources is the prediction that San Clemente Reservoir will fill with sediment within 6 to 10 years. As a result of this filling, the Annual Drawdown would only continue until the reservoir storage capacity is less than 50-acre feet. In the absence of new sediment management action, sediment would begin to move into or block the fish ladder, interfering with successful steelhead migration up the existing ladder.

Aquatic habitat conditions upstream of SCD in the Camel River and in San Clemente Creek would generally continue to improve as riparian vegetation would become established and continue to develop along the channel. This, in turn, would cause the banks to become more defined. All of the riparian vegetation along San Clemente Creek and most of riparian vegetation along 4,800 feet of the Carmel River upstream of SCD has developed since 1996 after the practice of raising the reservoir water level by 12 feet each spring was discontinued. The raised water level previously prevented vegetative growth in the inundated area below elevation 537 feet.

4.4.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

4.4.2.1 Standards of Significance

The significance criteria for evaluating project effects for this EIR/EIS are similar to the criteria and standards of significance used in the CRDRP (as modified and updated from the 1994 Final EIR/EIS for the New Los Padres Project) (MPWMD 1998). In accordance with these criteria, as well as CEQA Guidelines and agency and professional standards, a project impact would be significant if the project would:

- Have a substantial adverse effect, either directly or indirectly through habitat modifications, on any species identified as a threatened or endangered, candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG, NMFS, or USFWS;

- Prevents or interferes substantially with the movement of any native resident or migratory fish species;

- Conflicts with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

4.4.2.2 Impact Assessment Methodology

Impacts to Carmel River steelhead and aquatic habitat conditions are evaluated for the 2030 Baseline Condition (reservoir filled with sediment) and compared to Existing Conditions and to the Proponent's Proposed Project and each of the alternatives. The effects of the Proposed Project and each alternative are evaluated with respect to aquatic habitat conditions and fishery resources within each of the 6 fishery reaches or 10 geomorphic reaches in the Carmel River downstream of SCD and in the inundation area of the reservoir upstream of the Dam. Issues related to fish passage are also considered. Assessing the effects of sediment movement to downstream habitat is an important component of the analysis. Sediment will begin moving downstream when the reservoir fills with sediment (the No Project Alternative, Proponent's Proposed Project, and Alternative1), additionally with the operation of a sluice gate under the Proponent's Proposed Project or Alternative 1 and with dam removal under Alternatives 2 and 3.

Sediment, Aquatic Habitat Conditions and Effects on Steelhead

There are two general categories of sediment that are evaluated in this document relative to aquatic habitat conditions and steelhead populations: deposited sediment and suspended sediment.

Deposited sediment is the sediment that makes up the channel bed and banks and is carried in the river as bedload along the bottom of the channel primarily during storm events. Changes to the nature of the channel bed and floodplain can alter the physical habitat conditions in and along the river. Generally, finer sediment, such as sand, is more deleterious to biological resources than coarse sediment like gravel or cobble. Large volumes of sediment would generally cause negative changes to habitat conditions, regardless of the particle size of the sediment. Even moderate volumes of fine sediment can have deleterious effects on spawning habitat and on life stages ranging from zygotes to alevins buried in the gravel. Deposited fine sediments can reduce or cut off water flow through the gravel and suffocate zygotes. Deposition of coarse sand does not necessarily cut off inter-gravel flow, but can entomb alevins in the redd by creating a physical barrier between the redd and the river that young fish are not capable of escaping.

Large sediment volume can fill pools, obliterate channel features and turn single thread channels into multi-thread channels. Sediment flux (the change in sediment volume from year to year) can have varying effects on riparian vegetation. Moderate amounts of sediment deposited on the floodplain can provide a substrate for riparian vegetation to become established and grow. In contrast, large volumes of sediment can cover and kill established vegetation. Aquatic habitat conditions from deposited sediment are evaluated by looking at the change in reach-averaged bed elevation, change in substrate volume and change in volume of gravel at the end of the hydrologic simulation period.

The analysis of deposited sediment evaluates reach conditions to support adult upstream migration, spawning and incubation habitat for zygotes and alevins, and rearing habitat to support juvenile steelhead. Adult migration could be impaired if large volumes of sediment are deposited in the channel possibly creating critical passage conditions. Spawning and incubation habitat would be improved by an increase in the volume of gravel, or degraded by an increase in fines. Rearing habitat would be improved by an increase in cobble and gravel or degraded by an increase in fines.

Suspended sediment is fine sediment (mostly clays and fine sands) that is carried as suspended load in the water column greater than 0.5 foot above the bed of the channel. Some of the bedload in a river is moved along the bed by bouncing along the bottom, hence, the near bed water column contains both sediment that is carried in suspension and the coarser bedload. The water column above 0.5 feet over the bed primarily contains only suspended sediment. It is the suspended sediment that causes the muddy appearance of the Carmel River and other streams during storm flows. High suspended sediment levels normally occur in the Carmel River during winter runoff events when migrating adults, incubating zygotes, juvenile steelhead, and smolts can be present in the river. Any effects from the project that would alter winter turbidity conditions could affect these life stages.

During low flow periods which occur during the summer, water in the river is typically clear so an increase in turbidity or suspended sediment from project activities would have a detrimental effect on juvenile steelhead rearing in the river. Conditions could become adverse depending on the concentration of suspended sediment and the duration of exposure.

Analyses that evaluate effects on the various life stages of steelhead in the Carmel River depend on available information on steelhead population. Juvenile steelhead data is available from 1990 to 2004 (Table 4.4-3) and adult counts are available for 1992-2006 (Table 4.4-7). There is limited information on spawning use in the river and virtually no data on incubation. Most of the data available provides for an analysis on life stages from young-of-the-year to two year olds and adults. There is limited information available on the number or distribution of redds in the Carmel River and on the smolt life stage in the Carmel River. Life stages between smolts and adults occur in the ocean and would not be directly affected by the Proponent's Proposed Project. Therefore, analysis of effects to steelhead is focused on the juvenile data that includes young-of-the-year, yearling and two-year old fish and on the adults based on counts at SCD. Analyses of project effects on steelhead redds containing the incubation life stage and on the smolt life stage are based on information from the literature and inferences drawn from knowledge of the Carmel River steelhead biology.

DEPOSITED SEDIMENT

The effect of deposited sediment varies depending on the starting channel bed conditions and on the volume and sediment particle size of the deposited sediment. The habitat change for a gravel-cobble bed channel that is covered by fine sediment such as silt and fine to coarse sand would be negative as the fine sediment would fill in the interstitial spaces in the substrate and eliminate habitat for invertebrates and cover for fish. However, gravel substrate deposited on a stream bed that is composed primarily of boulder and cobbles could improve conditions for spawning, invertebrate production and juvenile rearing. An increase in streambed elevation could be positive for habitat if it improves pool and riffle sequences in the channel but this would depend on the degree of increase in elevation, the particle size, and the starting conditions of the bed.

Fishery and invertebrate effects were attributed to changes in bed elevation, change in volume of sediment and change in volume of gravel with the assumption that a change in reach-averaged bed elevation has to be greater than 0.5 foot to be meaningful because the average bed elevation includes both the wetted channel and flood plain. If the change in the model output meets that criteria, then aquatic habitat conditions are evaluated under the following guidelines: 1) an increase of 2 feet or more of channel bed elevation (aggradation) and/or an increase in sediment volume would tend to fill habitat features like pools and runs and create a braided channel or critical riffles that could create fish passage problems, 2) a decrease of 2 feet or more of channel bed elevation (degradation) and/or a decrease in sediment volume would tend to scour channel features such as riffles or bordering vegetation and act to simplify habitat. 3) An increase in gravel volume would generate a positive biological response by improving spawning habitat and invertebrate production, 4) a decrease in gravel volume could have a negative effect by degrading spawning habitat and invertebrate production if the gravel would be replaced by sand; 5) if gravel would be replaced by cobble, the effect would be neutral to positive.

As an example, in SR 4.3, aggradation and an increase in gravel volume could have a beneficial effect because the present armored condition of this reach provides for almost no gravel in this reach. However, in SR 9, in the lagoon, aggradation and an increase in sediment volume could have a negative effect on fisheries habitat because valuable deep water habitat for summer and fall growth could be reduced; conversely, degradation and a reduction in sediment volume in the lagoon would have a beneficial effect.

Changes in habitat quality related to substrate quality are evaluated through use of a sediment transport model (MEI 2003). The sediment transport model evaluated and compared Existing Conditions, the 2030 Baseline and Alternatives 1, 2 and 3. The 2030 Baseline model run represents conditions consistent with the Proponent's Proposed Project and Alternative 4 (reservoir full of sediment with a small remnant pool) and is similar to the modified baseline (reservoir full of sediment without a small remnant pool that was used to represent the worst case scenario for modeling the effects of sluicing) as presented in Hydrology Section 4.2. The sediment transport model predicts a change in sediment particle size and bed elevation in yearly time steps based on historical hydrology on a reach-averaged basis (Mussetter 2003). The effects of sediment particle size and change in bed elevation are evaluated as being "better," "worse," or "about the same" relative to Proponent's Proposed Project. Additional reports were prepared to address the specific effects of some alternatives on sediment transport (MEI 2005, 2006b). Appendix M provides additional information on the sediment model.

The model output sums the amount of sediment that each flow event moves past the Dam site and how much of that amount is deposited in the lower river at the end of the 41-year modeling period (Appendix N). Parameters from the model include change in bed elevation, change in sediment volume and change in volume of gravel for each subreach.

SUSPENDED SEDIMENT

The effects of suspended sediment were assessed using an index developed by Newcombe and Jensen (1996). Their work evaluated potential adverse effects on fish from suspended sediment through the development of an empirical model based on numerous laboratory studies that examined responses of fish to the length of exposure to various suspended sediment concentrations. Suspended sediment has been documented to affect steelhead in several ways.

At low levels suspended sediment can reduce visibility disrupting social interactions, and interfering with feeding behavior at low levels and causing habitat degradation and causing physical stress and harm at high levels of suspended sediment. The concentration and duration of exposure to suspended sediment are nearly equally important factors in assessing impacts to fish and aquatic habitat. Higher levels of suspended sediment and longer exposure times generally create a greater, more deleterious effect on fish. Even persistent low levels of suspended sediment can cause stress that reduces feeding, slows growth, impairs reproductive abilities, reduces population size, and causes mortality. At low concentrations, suspended sediment can cause avoidance behavior, reduced feeding, respiratory impairment, or reduced tolerance to disease and toxicants (Waters 1995). Suspended sediment can also affect fish ecologically by increasing invertebrate drift and reducing light penetration in the water column, thereby reducing primary productivity (ENTRIX 2005a).

Newcombe and Jensen (1996) developed the empirical model to estimate the effects of various levels of exposure to suspended sediment on fish. The equation for the empirical model is:

$$Z = a + b\ (ln[\text{exposure time}]) + c\ (ln[\text{concentration}])$$

<u>Where</u>:

Z is the Severity of Ill Effects Score (SEV); *a*, *b*, and *c* are factors adjusted according to fish species (or group) and life history stage; and *ln* is the natural log,

Newcombe and Jensen (1996) based their model on a large body of peer reviewed and published literature on the effects of fish exposure to suspended sediment. Data from many studies, most of them laboratory studies, were used to develop multiple regressions to generate the model equation. Although the model is useful in making broad estimations of suspended sediment effects, it has a wide range of error, and therefore needs to be applied with caution to average daily suspended sediment concentrations from the MEI model. Newcombe and Jensen's model helps to illustrate key points about the effects of suspended sediment on fish and on strength of the relationship between the SEV score and Level of Effect: 1) Duration of exposure is almost equal in importance to suspended sediment concentration in determining the overall effects of suspended sediment; 2) A wide range of suspended sediment concentration and duration of exposure can result in a similar SEV score (Figure 4.4-7, top and bottom); 3) There is an exponential difference between one Effects Level and the next, and 4) There is a large amount of overlap in the response of individual fish to suspended sediment concentration and duration (See Table 4.4-8).

EFFECTS LEVELS

Effects Levels are evaluated through the calculation of SEV scores and then the scores are used to group the effects into four different levels: No Effect (SEV=0), Behavioral Effects (SEV=1 to 4), Sublethal Effects (SEV=5 to 8), and Lethal and Paralethal Effects (SEV ≥ 9).

Behavioral effects (SEV Scores of 1 to 4) occur at relatively low levels of suspended sediment and can alter fish behavior. In some cases, fish initially will attempt to move away from turbid water into clearer water if it is available. Fish that remain in areas of elevated suspended sediment will experience reduced visibility. For visually oriented and territorial species such as steelhead trout, a reduction in visibility may result in a reduction in the efficacy of feeding as well as a breakdown of social structure in the stream.

Table 4.4-8: Effects and Severity Types of Ill Effects Scores (SEV) to Fish from Exposure to Suspended Sediments

No Effects (SEV=0)
Behavioral Effects (SEV=1-4)
Avoidance and distribution
Risk to predation
Reduced feeding
Sublethal Effects (SEV=5-8)
Impaired homing and migration
Respiratory impairment
Physiologic effects
Stress
Reduced growth
Reduced tolerance to disease and toxicants
Lethal and Paralethal Effects (SEV > 9)
Reduced growth rate
Reduced reproductive success
Reduced fish density
Moderate to severe habitat degradation
Direct mortality

Note: compiled from Newcombe and Jensen 1996 and Waters 1995

Sublethal effects (SEV Scores of 5 to 8) to fish health can occur from short- and long-term exposure to various levels of suspended sediment concentrations. High concentrations or long-term exposure to moderate levels of suspended sediment concentrations may cause respiratory irritation and impairment as well as a reduced tolerance to disease and toxicants. High suspended sediment concentrations may further disrupt sensory perception to the point of interfering with or preventing the homing behavior of migrating steelhead. All of these direct physiological impacts culminate in a general stress increase characterized by physiological symptoms such as elevated cortisol levels in the bloodstream.

Lethal and paralethal effects (SEV Scores of 9 to 14) may result from extremely high and/or prolonged exposure to suspended sediment concentrations. Harsh physiological effects may severely stress fish decreasing health or causing direct mortality. This level of effect would likely result in a measurable change in fish abundance and distribution and would be an adverse effect on the population. The youngest steelhead life stages may be particularly susceptible to mortality from the smothering of eggs in the gravel and the entrapment of emerging sac fry if high suspended sediment concentrations also result in the deposition of fines on the bed.

Newcombe and Jensen organized these effects into a relative scale presented in Table 4.4-8. Figure 4.4-7 shows the effects of suspended sediment concentration and duration of exposure on the average SEV scores on adult and juvenile salmonids.

Figure 4.4-7: Empirically Derived Average of Severity of Ill Effects (SEV) Scores Table (calculated) Showing the Relationships for Juvenile and Adult Salmonids

Juvenile and Adult Salmonids

Duration of exposure to SS ($\log_e$ hours)

(B) Average severity-of-ill-effect scores (calculated)

Concentration (mg SS/L)	0	1	2	3	4	5	6	7	8	9	10	($\log_e$ mg SS/L)
162755	10	11	11	12	12	13	14	14	-	-	-	12
59874	9	10	10	11	12	12	13	13	14	-	-	11
22026	8	9	10	10	11	11	12	13	13	14	-	10
8103	8	8	9	10	10	11	11	12	13	13	14	9
2981	7	8	8	9	9	10	11	11	12	12	13	8
1097	6	7	7	8	9	9	10	10	11	12	12	7
403	5	6	7	7	8	9	9	10	10	11	12	6
148	5	5	6	7	7	8	8	9	10	10	11	5
55	4	5	5	6	6	7	8	8	9	9	10	4
20	3	4	4	5	6	6	7	8	8	9	9	3
7	3	3	4	4	5	6	6	7	7	8	9	2
3	2	2	3	4	4	5	5	6	7	7	8	1
1	1	2	2	3	3	4	5	5	6	7	7	0
	1	3	7	1	2	6	2	7	4	11	30	
	Hours			Days			Weeks		Months			

Half-95% confidence intervals (±)
around calculated severity-of-ill-effect scores (above)

Concentration (mg SS/L)	0	1	2	3	4	5	6	7	8	9	10	($\log_e$ mg SS/L)
162755	0.9	0.8	0.8	0.8	0.7	0.7	0.8	0.8	-	-	-	12
59874	0.8	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.7	-	-	11
22026	0.7	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.7	0.7	-	10
8103	0.6	0.6	0.5	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.8	9
2981	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	8
1097	0.6	0.5	0.4	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.7	7
403	0.6	0.5	0.4	0.3	0.3	0.3	0.4	0.5	0.5	0.6	0.7	6
148	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.8	5
55	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.8	4
20	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.9	3
7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.0	2
3	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1
1	1.0	1.0	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.1	1.1	0
	1	3	7	1	2	6	2	7	4	11	30	
	Hours			Days			Weeks		Months			

Source: Newcombe and Jensen (1996)

The analysis of impacts uses an empirical model of suspended sediment concentration effects on salmonids to estimate effect levels.

Using the sediment model, average daily suspended sediment concentrations (SSC) (in the water column greater than 0.5 feet above the river bed) were simulated for the 41 year period of record for Existing Conditions, the 2030 Baseline, and the project alternatives. These results were examined using a frequency analysis and time series graphs.

Average daily suspended sediment concentrations were simulated to compare potential effects of sediment management activities (sluicing) with the same dam configuration without sluicing for a wet year (1978) and dry year (1985) to represent conditions for the Proponent's Proposed Project and Alternative 1. Dam removal would occur under Alternatives 2 and 3; sluicing would not be a component of these two alternatives.

The representative suspended sediment analysis was run from the simulated sluice event date to the end of June because the model routed sediment down the fish ladder during the low-flow season. Sediment movement down the fish ladder during the low flow season would be precluded by other sediment management activities so the analysis of suspended sediment was restricted to the period from the modeled sluice event to June 30 and did not include the period from July 1 to the end of the calendar year. The details of sluicing events are discussed in Section 4.2 and Appendix J.

Using the SEV scores developed by Newcombe and Jensen (1996) described above, the number of consecutive days of average daily suspended sediment level for each geomorphic reach was accumulated for each day to equate to an SEV score for the simulated wet-year (to June 30) for the 2030 Baseline and compared to Existing Conditions, the Proponent's Proposed Project and each alternative. For the Proponent's Proposed Project and Alternative 1, a modeled sluicing event was added to the analysis for comparison purposes. The comparable SEV scores are summarized by Geomorphic subreach for Existing Conditions, 2030 Baseline (representing Alternative 4 or Future No Project conditions), the Proponent's Proposed Project and each Alternative (Table 4.4-9).

The simulated exposure times for modeled suspended sediment concentration data were not directly applied to the X and Y axes of the Newcombe and Jensen empirical model provided in Figure 4.4-7 (top graph) because the modeled suspended sediment concentration is based on average daily values whereas Newcombe and Jensen (1996) used a time step based on hours. In nature, suspended sediment is highly variable through time and space and reach-averaged daily values do not necessarily represent the range of concentrations of suspended sediment or exposure durations that fish in the river would experience. However, the analysis is a comparison of similarly structured modeled information and therefore can be used to make an informed comparison for the basis of this evaluation.

Table 4.4-9: Severity of Ill Effects Scores (SEV) for Suspended Sediment Concentrations

Subreach	Existing conditions	2030 Baseline	Proponent's Proposed Project	Alt 1	Alt 2	Alt 3
4.3	7	7	8	8	8	7
4.7	7	7	7	7	8	7
5	7	7	7	7	9	7
6.3	7	8	8	7	8	8
6.7	7	8	8	8	8	8
7.3	7	8	8	8	8	8
7.7	7	8	8	8	7	7
8.3	7	8	7	7	7	7
8.8	7	8	7	7	7	7
9	7	8	8	8	7	8

Note: Scores represent the number of consecutive days and Suspended Sediment Concentrations following a wet year sluice event for the existing conditions and 2030 Baseline compared to the Proponent's Proposed Project and alternatives by Subreach. The 2030 Baseline also represents the Future No Project Condition.

The suspended sediment model provides average daily values for suspended sediment concentration from post-processed simulations. Because of the modeling limitations, it is probably not valid to compare SEV scores between the Proponent's Proposed Project and the alternatives to evaluate differences in impacts. The error table (Figure 4.4-7, bottom graph) shows that the error in the SEV scores is relatively large. In consideration of the error inherent in the Figure 4.4-7 and the additional limitations imposed from the simulations, a more equitable assessment would be to compare effects levels (Table 4.4-8) instead of actual SEV scores (Table 4.4-9). The SEV scores are discussed and compared to support the effect levels determination.

Comparisons of the change in effect level are made between the 2030 Baseline condition, Existing Conditions, and Alternatives 1, 2, and 3. A difference in the SEV score within an effect level would not be either a significant or beneficial impact because of the factors described above. However, a change in effect level would be either significant or beneficial. SEV scores are presented in the following discussion to support the findings of the analysis. The effects levels in the Lethal and Paralethal range would be adverse for the population or habitat for the purposes of determining the level of significance of an action.

The SEV scores are shown in Table 4.4-9, and their corresponding effect level is shown in Table 4.4-8. The scores indicate that under existing conditions, storm events result in SEV scores of 7 in the 10 geomorphic subreaches downstream of SCD for the simulated hydrologic period. Under the 2030 Baseline, SEV scores increase from 7 to 8 in the downstream-most seven reaches (from 6.3 to 9) compared to the existing conditions because fine sediment would no longer be trapped in the reservoir after it has filled. For the Proponent's Proposed Project, SEV scores increase from 7 to 8 in six subreaches (4.3, 6.3, 6.7, 7.3, 7.7, and 9), compared to Existing Conditions and are similar to the 2030 Baseline. For Alternative 1, SEV scores increase from 7 to 8 in five subreaches (4.3, 6.7, 7.3, 7.7, and 9), compared to Existing Conditions, and are similar to the 2030 Baseline. For Alternative 3, SEV scores increase from 7 to 8 in four subreaches (6.3, 6.7, 7.3, and 9), compared to Existing Conditions, and are similar to the 2030 Baseline. For the Proponent's Proposed Project, Alternatives 1 and 3 SEV scores do not result in significant changes compared to either Existing Conditions or 2030 Baseline because the SEV score remains within the Sublethal Effects Level. Additionally, the Proponent's Proposed Project, Alternative 1, and Alternative 3 each result in a change in SEV scores that are less than the SEV scores for the 2030 Baseline Condition.

For Alternative 2, the SEV scores increase from 7 to 8 in five subreaches (4.3, 4.7, 6.3, 6.7 and 7.3) and increase from 7 to 9 in one subreach (5) compared to Existing Conditions. The SEV scores increase from 7 to 8 and are similar to the 2030 Baseline, except in Subreach 5 that increases from an SEV of 7 to 9. This would be a significant impact because an increase from an SEV of 7 to SEV of 9 indicates the effect changes from the Sublethal Effect Level to the Lethal and Paralethal Effect Level.

Modeled suspended sediment concentrations were graphed to compare the suspended sediment effects of the Proponent's Proposed Project, and all alternatives (Appendix P, Figures P-1 through P-20).

Flow

The effects of the various alternatives on flows in the Carmel River were evaluated in 1998 for and presented in the 2000 RDEIR (Denise Duffy & Associates 2000) in Appendix D. Flow changes were found to be insignificant because the project is a dam safety project and would not change storage volume or operations. Flows are influenced by a change in storage behind a dam. This project would not result in an increase or decrease in storage but would maintain the status quo in regard to storage volume behind SCD. Short-term effects on flow from construction activities are addressed in the Impacts and Mitigation Section 4.4.3. Relocation of the point of diversion on the Carmel River upstream would affect flows in the section of river between the new diversion point and SCD where water is presently diverted. This effect is also addressed in the Impacts Section 4.4.3.

Construction and Operation Activities

This assessment evaluates effects of construction and operation on aquatic habitat in the Carmel River and on the steelhead population. The river channel in the vicinity of the Dam and downstream would be affected by the construction activities of the Proponent's Proposed Project and each alternative. Construction activities for road and bridge improvements to access the Dam or reservoir would occur during the first construction year primarily during the low flow season — June to October. Dam strengthening, notching or removal would occur in subsequent construction years and would only occur during the low flow season. The steelhead life stage that would be most affected by reservoir and stream dewatering and construction-related activities would be the juvenile rearing life stage. Fry and yearling steelhead would be rearing in the river. The adult and smolt migration is essentially complete and redds would no longer hold alevins by June. Construction impacts, therefore, are evaluated in regard to the juvenile rearing life stage.

Operations following project implementation would affect all life stages of steelhead in the river downstream in all seasons. Conditions in the river downstream of SCD could be affected by sluicing to maintain fish passage through the reservoir during early winter storm events and by the transport of larger volumes of sediment passing the Dam for Alternatives 1, 2, and 3 compared to existing conditions. Under Alternative 4, No Project, sediment transport past the Dam would also increase relative to existing conditions because in six to ten years the Dam would be full of sediment.

Bed sediment transported past the Dam would affect aquatic habitat in the river downstream of SCD. These changes would affect all life history stages of steelhead including migrating adults, spawning habitat, incubation, rearing habitat and smolt outmigration.

Operations for the Proponent's Proposed Project and Alternative 1 include sediment sluicing to maintain fish passage through the remnant reservoir. Sediment sluicing is one method to manage sediment that accumulates behind the Dam for fish passage. Sluicing events would occur with the first storm event of the season and would affect fish in the river during the early winter period. Sluicing protocols require the sluice event to be staged as the river flow increases over 300 cfs. At flows above 300 cfs the channel segment immediately downstream of the Dam would have sufficient transport potential to mobilize all the sediment released during the following storm event. The analysis examines the levels of suspended sediment that steelhead in the river would be exposed to under the Proponent's Proposed Project and each alternative relative to existing and No Project conditions. Suspended sediment is primarily evaluated for its effect on rearing juvenile steelhead in the river, but the assessment is also applicable to adult steelhead.

Impacts are assessed on a river-wide basis using four components: 1) The amount and distribution of spawning habitat throughout the Carmel River system that has been assessed by Dettman (1990) and modeled in the mainstream Carmel River upstream and downstream of SCD by Alley & Associates (1992 and 1998) 2) The amount of juvenile steelhead rearing habitat available in the Carmel River summarized for the upper, middle and lower portions of the watershed and expressed as rearing habitat units. For this assessment, the upper portion of the Carmel River is defined as upstream of LPD, the middle portion is between San Clemente Reservoir and LPD and the lower portion is downstream of SCD (Dettman 1990). Only a gross estimate for steelhead abundance is available for the existing reservoirs. 3) The 1990 to 2004 average density of juvenile steelhead in the Carmel River fishery reaches and, 4) Adult steelhead counts in the SCD ladder. The two components of rearing habitat (distribution of juvenile rearing habitat and average juvenile density) are the best data available to make estimates of impacts. However, it should be noted that habitat conditions and juvenile steelhead density can change markedly from year to year, depending on habitat changes resulting from the magnitude of winter flood events and the flow conditions in the lower river during the dry season.

In the presentation of the following impact mechanisms for fisheries, estimates are provided for the amount of channel affected by construction activities such as dewatering, or by project operations such as sluicing. The evaluation of impacts compares the amount of rearing habitat (length of channel) and an estimated number of steelhead affected by a project activity (Table 4.4-10). The estimated number of juvenile steelhead is based on the average juvenile density data collected by MPWMD. These data are compiled by river reach and expressed as the number of fish per linear foot of channel. The average annual reach density was multiplied by the length of the channel to estimate the juvenile abundance for Reaches 1 through 8. This represents an estimate of the total juvenile abundance for the mainstem Carmel River between LPD and State Highway 1. There is no consistent data to estimate juvenile steelhead abundance upstream of LPD, in the tributaries, or the lagoon in Reach 9. Therefore, the impacts to juvenile abundance based on this data would represent an over-estimate since it does not include all of the habitats supporting steelhead in the river and would represent a conservative estimate relative to the overall impact to juvenile steelhead in the Carmel River.

In regard to the distribution of spawning rearing habitat in the river, the amount of juvenile steelhead rearing habitat available downstream of SCD represents is about 28 percent of the 0+ and 23 percent of 1+ habitat in the watershed according to Dettman and Kelley (1986) (Table 4.4-6). These estimates do not include habitat in Fishery Reaches 3, 7, 8 or 9 (Dettman and Kelley 1986). About 30 percent of the potential spawning habitat in the watershed is available downstream of SCD (Dettman 1990). For the purposes of this analysis, we assumed that about a 30 percent of the spawning habitat in the river and 25 percent of the juvenile rearing habitat (0+ and 1+ combined) in the river occurs downstream of SCD. These percentages provide a point of comparison to assist in evaluating relative effects of the Proponent's Proposed Project to the Alternatives on a river-wide basis. Estimates of steelhead densities and abundance are provided in Table 4.4-10.

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Table 4.4-10: Amount of Habitat and Estimated Number of Rearing Juvenile Steelhead Affected by Construction and Operations for Each Alternative

		Estimated Length of Channel Dried and No. of Steelhead Rescued for each Construction Year or Length of channel affected by Diversion					Estimated SH[f] Affected by Suspended Sediment and Streambed Changes downstream of SCD from construction and operations				% SH Affected by Construction Activities	% of SH Habitat Affected by Construction Activities	% SH Affected by Sus. Sed. from Operations	% Rearing Habitat Affected by Operations
		Reach 3(L)[a]	*Reach 3(U)[a]*	*S.C. Creek[b]*	*Reach 4*	*Tularcitos[b]*	*Reach 4[c]*	*Reach 5[c]*	*Reach 6[c]*	*Reach 7[c]*				
Existing Conditions	Reach Length (ft)	2,200	4,300	1,350	14,950	100	14,950	7,040	19,250	15,300				
	Steelhead reach density (fish per ft)[d]	0.50	0.73	0.50	0.54	0.50	0.54	1.02	1.04	0.91			Total Average SH downstream of LPD =	79,843
	SH Population Estimate[e]	1,100	3,139	675	8,053	50	8,053	7,167	20,020	13,923			Total channel downstream of LPD (ft) =	133,584
Proponent's Proposed Project	Length (ft)	1,200	0	0	500	100	14,950	7,040	0	0				
	Construction Year 1 (SH)	0	0	0	0	50	2,532	7,167	No Effect	No Effect	0.04	0.1	12.1	
Steelhead Rescued during Construction	Construction Year 2 (SH)	600	0	0	269	0	8,053	7,167	No Effect	No Effect	1.0	2.0	19.1	
Steelhead Affected by Operations	Sluicing Operations (SH)	550	N/A	N/A	N/A	N/A	8,053	7,167	20,020	13,923			61.6	42.3
	Water Intake Diversion	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A				
Alternative 1	Length (ft)	2,200	4,300	1,850	500		14,950	7,040	0	0				
	)													
Steelhead Rescued during Construction	Construction Year 1 (SH)	N/A	N/A	N/A	269	N/A	2,532	7,167	No Effect	No Effect	0.2	0.0	12.1	
	Construction Year 2 (SH)	1,100	3,139	675	269	N/A	8,053	7,167	No Effect	No Effect	3.1	5.2	19.1	
	Construction Year 3 (SH)	1,100	3,139	675	269	N/A	8,053	7,167	No Effect	No Effect	3.1	5.2	19.1	
Steelhead Affected by Operations	Sluicing Operations (SH)	550	N/A	N/A	N/A	N/A	8,053	7,167	20,020	13,923			61.6	42.3
	Water Intake Diversion (SH)	3,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Alternative 2	Length (ft)	2,200	4,300	1,850	500		14,950	7,040	0	0				
Steelhead Rescued during Construction	Construction Year 1 (SH)	N/A	500	N/A	269	N/A	2,532	No Effect	No Effect	No Effect	0.6	0.6	3.2	
	Construction Year 2 (SH)	1,100	3,139	925	269	N/A	8,053	7,167	No Effect	No Effect	4.2	4.2	19.1	
	Construction Year 3 (SH)	1,100	3,139	925	269	N/A	8,053	7,167	No Effect	No Effect	4.2	4.2	19.1	
	Construction Year 4 (SH)	1,100	3,139	925	377	N/A	8,053	7,167	No Effect	No Effect	4.3	4.3	19.1	
Steelhead Affected by Operations	Operations (#SH)	N/A	N/A	N/A	N/A	N/A	8,053	7,167	20,020	13,923			**61.6**	**42.3**
	Water Intake Diversion	3,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Alternative 3	Length (ft)	2,200	1,000	1350	500		14,950	7,040	0	0				
Steelhead Rescued during Construction	Construction Year 1 (SH)	N/A	N/A	N/A	N/A	N/A	2,532	No Effect	No Effect	No Effect	0.00	0.0	3.2	
	Construction Year 2 (SH)	1,100	730	675	269	N/A	8,053	7,167	No Effect	No Effect	2.2	2.2	19.1	
	Construction Year 3 (SH)	1,100	730	675	377	N/A	8,053	7,167	No Effect	No Effect	2.3	2.3	19.1	
Steelhead Affected by Operations	Operations (#SH)	N/A	N/A	N/A	N/A	N/A	8,053	7,167	20,020	13,923			**61.6**	**42.3**
	Water Intake Diversion	1,700	N/A	N/A	N/A	N/A								
No Project	Diversion (ft)	0	0	0	0	0	0	0	0	0	0.0	0.0		
	Operations (#SH)	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0

Notes

a Reach 3 is divided in Lower (L) and Upper (U) subreach. For impacts that exceed total Reach 3 length (Alts 1 and 2), abundance is based on Upper Reach 3 density

b Rearing juvenile steelhead density estimated at 0.5 SH/foot of channel for San Clemente and Tularicitos creeks.

c Reach Distance is from Figure 4.4-6

d Average annual steelhead (SH) per linear foot of stream based on reach station during MPWMD fall surveys (Table 4.4-3)

e Abundance is based on long-term average estimate of juvenile standing crop by Fishery Reach downstream of LPD excluding Reach 9 (Lagoon) and tributaries

f Estimated SH is number of steelhead affected within each reach

g Underlined Bolded Text denotes long-term beneficial effects from restoration of sediment transport past the Dam

Impact Mechanisms and Timeframes

Direct impacts are defined as those caused by project activities that occur at the same time and place. Indirect or secondary impacts are defined as those caused by project activities that occur later in time, are one step removed, or removed by distance but are still reasonably foreseeable.

Direct impacts would be expected to occur in the reservoir or stream channels where dewatering occurs to support construction activities such as dam strengthening, demolition, bridge and road construction and sediment removal. Direct impacts would also arise from construction activities that occur outside of the stream channels, along the access roads, in the watershed at sediment disposal sites and downstream of in-channel construction sites. Direct impacts include temporary changes to flow volume, water temperature regimes and turbidity or sedimentation. These changes are evaluated based on the magnitude of change, amount of habitat affected and, duration of time and season(s) over which the event is expected to occur. These effects are evaluated by an analysis of the anticipated extent of changes to temperature, turbidity, suspended sediment, and sedimentation levels in downstream reaches.

Indirect impacts would result from effects that are one-step removed or physically distant from the location of the impact. For example, higher turbidity levels may reduce feeding rates, available food, or invertebrate production that would then affect growth rate in fish. The reduction in the shading provided by riparian vegetation would affect temperature regimes in the river that could affect habitat conditions for juvenile steelhead.

Project activities are identified as having a short-term or long-term impact. Short-term impacts are those that are typically construction related. Long-term impacts are those that endure beyond the construction period. Long-term time frames are defined as those that last from months to years, and also cover events that may occur periodically into the future but may not be continuous.

The following impact issues have been defined for Fisheries:

- FI-1 – Access Route Improvements (short-term alteration of aquatic habitat)
- FI-2 – Dewatering River Channels for Construction Purposes (short-term loss of aquatic habitat)
- FI-3 – Operation of a Trap and Truck Facility at OCRD (removed from analysis)
- FI-4 – Diversion of Carmel River and San Clemente Creek around San Clemente Reservoir for Construction Purposes (short-term loss of aquatic habitat)
- FI-5 – Reservoir Dewatering (short-term loss of aquatic habitat)
- FI-6 – Water Quality Effects on Fish (short-term loss of aquatic habitat)

- FI-7 – Fish Ladder Closure (short-term limiting fish movement past the Dam site)
- FI-8 – Upstream Fish Passage (long-term impact to fish migrating to upstream spawning and rearing habitat)
- FI-9a – Sediment Impacts to Downstream Channels from Sluicing, Dredging or Sediment Transport Downstream (long-term alteration of aquatic habitat)
- FI-9b – Impacts to Fish from Excavation or Dredging of Sediment for Fish Passage (potential juvenile fish entrainment and mortality)
- FI-10 – Relocate CAW Water Diversion Upstream (long-term reduction of flow in reaches of Carmel River between the new diversion point and dam)
- FI-11 – Fish Screen Installation (long-term elimination of entrainment or impingement at the diversion)
- FI-12 – Downstream Fish Passage over SCD (long-term improvement to fish passage over the Dam)
- FI-13 – Stream Sediment Removal, Storage, and Associated Restoration (long-term reduction of aquatic habitat, short-term alteration of aquatic habitat)
- FI-14 – Notching Old Carmel River Dam (OCRD) (short-term loss of rearing habitat, improvement of fish passage)
- FI-15 – Sleepy Hollow Steelhead Rearing Facility (loss or degradation of water supply)

4.4.3 IMPACTS AND MITIGATION

This Final EIR/EIS analysis describes the impacts or benefits associated with the Proponent’s Proposed Project, and each alternative, relative to existing conditions. Mitigation actions are described to minimize or compensate for the effects of the project. The analysis evaluates impacts to steelhead through the impact mechanisms which describe the type and magnitude of impact. Any project would require permitting which could involve the adoption of conditions and mitigation measures beyond those identified in the Final EIR/EIS.

One of the requirements for the Proponent's Proposed Project as well as for Alternatives 1, 2, and 3 is the issuance by the USACE of a Clean Water Act Section 404 permit to dredge or fill waters of the U.S. The application for a Section 404 permit for the Proponent's Proposed Project has been filed with the USACE. Section 7 of the ESA requires the USACE to consult with USFWS and NMFS whenever listed species may be affected by the action to be permitted. In this case, the USFWS will be consulted concerning the California red-legged frog, and NMFS will be consulted concerning the California South Central Coast steelhead trout. During this process, the USACE will prepare BAs for the relevant species and submit them to the respective agency. USFWS, in turn, will prepare a BO for the California red-legged frog and NMFS will prepare a BO for the steelhead. If the action is found not to jeopardize the continued existence of the species, each BO will provide for appropriate mitigation to meet conditions of the Section 404 permit. The USFWS and NMFS each will include an "incidental take" statement as part of the BO if it appears that some of the listed species will be lost as a result of the permitted action. (This ESA consultation process will proceed in parallel with NEPA review). Final Section 404 permit mitigation conditions could be the same as or in addition to any required NEPA/CEQA mitigation; ultimate jurisdiction over the selection, implementation and monitoring of mitigation measures lies with the appropriate federal agency.

Similarly, the Proponent's Proposed Project and Alternatives 1, 2, and 3 will require agreements with the CDFG. Such agreements may contain conditions requiring mitigation that could be the same as or in addition to the NEPA/CEQA mitigation outlined in this report. This section 4.4 addresses NEPA/CEQA mitigation for Fisheries. Vegetation and Terrestrial Species are covered in Section 4.5 and Wetlands in Section 4.6.

4.4.3.1 Proponent's Proposed Project (Dam Thickening)

Issue FI-1: Access Route Improvements

Short-term alteration of aquatic habitat
Determination: ***less than significant with mitigation, short-term, less than significant with mitigation, long-term***

IMPACT

Construction of the bridge across Tularcitos Creek would directly affect aquatic habitat through removal of riparian vegetation during construction year (CY) 3. Road approach and bridge construction would result in the loss of up to 50 feet of riparian vegetation shading along each bank of Tularcitos Creek during Phase 1.

Road improvements along the Carmel River between the Sleepy Hollow Ford and OCRD would affect aquatic habitat through removal of riparian vegetation reducing shading and food resources. Indirect and direct, short-term impacts may be caused by sedimentation and increased turbidity along about a mile of the Carmel River from OCRD downstream to the Sleepy Hollow Ford from road construction, including rock blasting, and widening in CY 3. The Carmel River would not be dewatered to upgrade the piers and bridge deck at the OCRD. Road widening activities along the Carmel River would potentially expose rearing juvenile steelhead along about a third of Reach 4 to short-term minor increases in suspended sediment.

Road construction and widening along the Carmel River between the Sleepy Hollow Ford and OCRD and road construction between the OCRD and SCD would directly and indirectly affect aquatic habitat by the removal of riparian vegetation along the east bank of the Carmel River during CY 3. Reduction of riparian habitat would reduce the amount of shading along the river and reduce the source of terrestrial insects as a food resource for juvenile steelhead along Reach 4 of the Carmel River for about one mile, affecting about four percent of the habitat downstream of LPD and slightly less than four percent of the juvenile steelhead downstream of LPD (Table 4.4-10). This would be a significant impact.

MITIGATION

Riparian Vegetation

BMPs for riparian vegetation, identified in Appendix U (Botanical Resources Management Plan), would mitigate for some construction activities. Although these measures are typical of those applied to construction activities, they have not received formal approval by NMFS, CDFG, USFWS, CCRWCB, or DWR.

Tularcitos Creek

Water quality would be protected during construction (see Section 4.3 and Appendix K (Storm Water Pollution and Prevention Plan [SWPPP]) for mitigation measures to address sedimentation and turbidity), and the stream margins would be revegetated with native species when construction work is completed as described in Appendix U.

Carmel River

Measures would be taken to minimize effects of blasting for road widening activities (such as falling rock debris) in areas near the channel. Blasting mats and temporary walls would be used to prevent rock fall and blast debris from entering the river channel (see SWPPP, Appendix K) for mitigation measures to minimize sedimentation and turbidity). Tree removal would be limited to only those limbs or trees that require cutting to meet access requirements along the Carmel River between the Sleepy Hollow Ford and the OCRD. Construction of the road from OCRD to SCD would minimize tree removal to the extent practical by careful consideration of road alignment, equipment access routes and laydown areas. Road fill would be needed to raise the access road above frequent flood elevations. The fill would be placed on a fabric or rubber liner on the floodplain. Rip rap or boulders that are too large for the river to move during floods would be used to face the road fill to prevent mobilization of the fill. An erosion control and road drainage plan as described in Appendix K (SWPPP) would avoid or eliminate aquatic impacts due to sedimentation and turbidity. The boulder covering, road-fill and fabric or rubber liner would be removed after access to the base of the Dam was no longer necessary. Disturbed areas would be revegetated if necessary.

The use of blasting mats and temporary walls will substantially reduce the amount of rock material and dust directly entering the Carmel River. Shading and invertebrate habitat is provided by trees along on both sides of the river and by rushes growing on the banks and in the river. Shading is also provided by the steep canyon topography. Tree and limb removal will be minimized by removing only those trees or limbs of trees that are necessary to provide clearance along the access road. Limb removal would primarily occur on the outside of the riparian zone along the road while river shading is primarily provided by trees or branches overhanging the river. Therefore, limb removal toward the outside of the riparian zone would have minimal effects on overall river shading. Invertebrate input from the canopy would be affected by limb removal since insects from most locations in the riparian zone fly or fall into the river from the canopy overhead. Selective tree and limb removal will minimize the amount of tree canopy removal along the Carmel River. The reduction in overall canopy to the river would be relatively minor because it would involve only a portion of the total canopy along the east side of the river. The canopy along the west side of the channel would not be altered. Afternoon summer shade along the western side of the river is more critical to temperature regulation. Given these mitigations, overall canopy is expected to relatively minor.

The Carmel River between SCD and the Sleepy Hollow Ford contains about four percent of the juvenile steelhead and four percent of the rearing habitat downstream of LPD. Impacts from construction activities to suspended sediment in the river would be confined to the upper sections of Reach 4 and minimized by the use of temporary walls and blast nets. Blasting and rock removal would affect about a mile of river channel downstream of SCD in the short-term. With mitigation this would be a less than significant, short-term impact.

Impacts from tree or limb removal would be occur at localized sites but collectively would affect shading and terrestrial invertebrate input to the Carmel River in Reach 4. The reduction in shade and terrestrial invertebrate input would extend beyond the construction period until the tree canopy recovers and by definition would be a long-term impact. Minimizing tree or limb removal would reduce the effect of shade loss and invertebrate input by reducing the amount of canopy removed during construction. This would be a less than significant, long-term impact.

Issue FI-2: Dewatering River Channels for Construction Purposes

Short-term loss of aquatic habitat
Determination: ***significant, unavoidable, short-term***

IMPACT

Approximately 100 feet of Tularcitos Channel would be dewatered during CY 3 construction for up to eight months for the construction of a new bridge over Tularcitos Creek. A small diversion weir would be constructed upstream of the dewatered reach to direct streamflow into a pipe that would convey through the construction site.

The plunge pool and about 400 feet of channel immediately downstream of SCD would be dewatered to facilitate dam thickening in CY 4. The plunge pool would be isolated from the river by the installation of two downstream cofferdams. A pump would be used to dewater the pool and any channel segments still holding water. The pool would be filled with crushed rock to support the base of a tower crane. The material used to fill the pool would be removed and the pool restored to pre-disturbance condition once the Dam thickening is complete.

Juvenile steelhead rearing habitat would be lost for a single construction year during the time the channel segments are dewatered. The reach of Tularcitos Creek and the dewatered Carmel River reach both provide rearing habitat for juvenile steelhead that would be lost for one rearing season each. This would be a significant impact because rearing habitat could not be replaced during the construction phase.

Based upon the average juvenile steelhead density for Reach 4 of 0.54 fish per linear foot of channel, rearing habitat supporting about 270 juvenile steelhead would be lost in the plunge pool and 400 feet of channel and the rearing habitat would be lost for a single season. Steelhead present in the Carmel River are listed as a federally threatened species and loss of these fish would be a significant, short-term impact.

MITIGATION

Fish rescues would be undertaken to capture and relocate fish from the affected reaches and relocate them to sections of the Carmel River that would support their growth and development. Fish would be rescued primarily with the use of block nets, seines and dip nets. Backpack electrofishing units would be used if bottom topography makes the use of nets ineffective. Electrofishing would follow guidelines established by NMFS (2000).

Streamflow from the Carmel River upstream of SCD would be directed into appropriately-sized flex pipes and inflowing water would be diverted around the plunge pool and the section of the river to be dewatered. Once flow is diverted out of the channel, water levels would be reduced in the plunge pool and other sections of the river by pumping. Once water levels are lowered in a section of river, a fish rescue would begin and continue until all possible fish are removed from the dewatered reach.

The fish rescue would be completed prior to the complete dewatering of a reach. Field crews would continue to search for stranded fish during the final phases of dewatering. Some fish mortality may occur as a result of the rescue efforts. Capture and handling increases stress and presents a risk of injury.

Captured fish would be temporarily held in aerated coolers for transport to relocation sites. Rescued fish would be transported downstream and released into the Carmel River near the Carmel Valley Filter Plant or moved to the SHSRF if rearing capacity in the release site in the river is already at the maximum capacity. Water quality would be protected during construction (see Section 4.3 and Appendix K for BMPs addressing sedimentation and turbidity). The plunge pool would be restored to its original configuration after CY 4.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead cannot be fully mitigated and would be significant.

Issue FI-3: Operation of a Trap and Truck Facility at OCRD

Short-term loss of access for adult steelhead to upstream reaches
Determination: ***Removed from the analysis***

The operation of a Trap and Truck facility has been eliminated from the fisheries impact issues. In the Draft EIR/EIS, operation of the Trap and Truck facility was proposed as mitigation for Fish Ladder Closure (Impact Issue FI-7) which was anticipated to occur in late April or May. Based on regulatory agency input, the earliest that instream construction-related actions could begin is on June 15. Construction activities requiring diversion of the river would begin on June 15 or the first day thereafter when the flow passing San Clemente Dam is 50 cfs or less. This timeframe has virtually eliminated the Fish Ladder Closure Issue. The fish ladder has only operated through June once since 1998.

Additionally, construction could not occur until all inflow to the reservoir can be diverted around the reservoir and released downstream. The planned bypass flow capacity is 50 cfs. The combined restriction of a June 15 (river diversion start date) and at a flow less than 50 cfs means that it is unlikely that the project would affect any upstream migrating adult steelhead. In 1998, the year when 13 adult fish moved upstream in June, flows dropped from approximately 200 cfs on June 1 to about 80 cfs by June 30.

With the calendar date and flow constraints there would be few, if any years when upstream migrating adults would be present in the ladder and there would be minimal, if any impairment to upstream migration. Consequently, a Trap and Truck operation would not be warranted. See Impact Issue FI-7, Ladder Closure, for a more comprehensive discussion of the adult migration issues.

Issue FI-4: Diversion of Carmel River and San Clemente Creek around San Clemente Reservoir for Construction Purposes

Short-term loss of aquatic habitat
Determination: ***significant, unavoidable, short-term***

IMPACT

The Carmel River and San Clemente Creek would be diverted around San Clemente reservoir and dam site. A sheet pile cutoff wall would be used to collect and divert water from the Carmel River and San Clemente Creek into pipes designed to carry up to 50 cfs for the Carmel River and up to 10 cfs for San Clemente Creek. The collected water would be conveyed by the pipes installed parallel to, or in the channels, along both streams to a location about 500 feet downstream of SCD, where flow would be returned to the Carmel River. The intakes of both pipes would be screened consistent with CDFG and NMFS criteria to prevent the entrainment of and to reduce the opportunity for impingement of fish, frogs, and other aquatic organisms.

The diversions would have direct, short-term impacts to rearing habitat upstream of the reservoir, in about 1,200 feet of the inflowing Carmel River, and in less than 100 feet of San Clemente Creek. The diversion intake location on San Clemente Creek would be located near the confluence of the creek with the reservoir. Diversion of water into bypass pipes would affect rearing habitat for up to approximately 600 juvenile steelhead in the Carmel River and a few fish in San Clemente Creek (Table 4.4-10). These impacts would occur during CY 4. This would be a significant, short-term impact.

MITIGATION

Mitigation for dewatering the Carmel River would be similar to mitigations described in FI-2. In addition to actions mentioned in FI-2, fish traps would be installed upstream of diversion points to capture downstream migrating fish so they could be transported around the diversion site and continue their downstream movement. Fish would be rescued from the area of the diversion sites prior to constructing the diversion structures. Once the sheet piles are installed and the diversion pipes connected, water would be diverted into the pipes. Flow in the river channel downstream of the diversion would be reduced and the reduction in flow would facilitate fish rescues. A fish rescue would occur in the Carmel River and San Clemente Creek channels between the diversion point and the reservoir. Block nets would be set near the mouth of each stream to prevent fish from moving upstream of the reservoir. Once all fish were rescued from the channels, all flow would be directed into the bypass pipes. Some fish mortality may occur as a result of the rescue efforts, capture and handling increases stress and presents a risk of injury. See Impact FI-2.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of rearing habitat for steelhead cannot be fully mitigated and would be significant.

Issue FI-5: Reservoir Dewatering

Short-term loss of aquatic habitat
Determination: ***significant, unavoidable, short-term***

IMPACT

The reservoir would be lowered from about 525 to 510 feet elevation and sheet piles would be installed in the reservoir around the inoperable mid-level intake gate located 31 feet below the spillway crest. The area between the Dam and the sheet piles would be excavated to expose the intake gate, and the intake gate would be repaired to operating condition.

Lowering the water level to 510 feet would initially create a shallow, warm pool of standing water behind the reservoir with an estimated maximum depth of about five feet. The water level would be lowered to the bottom of the reservoir (approximately 505 feet elevation) once the intake gate was repaired. Construction dewatering would cause a loss of steelhead and a short-term loss of steelhead rearing habitat in the reservoir during the construction season in CY 4. This would be a significant, short-term impact.

MITIGATION

Nets would be installed across the channels leading into the reservoir to prevent fish from swimming upstream into the Carmel River and San Clemente Creek. A fish rescue would occur in the reservoir during drawdown. Fish would be captured using large and small seines and dip nets. Backpack electrofishing units may be used if needed. Electrofishing would follow guidelines established by NMFS (2000). Rescued fish would be relocated to other suitable habitat downstream of OCRD in the Carmel River. Some fish mortality may occur as a result of the rescue efforts. Capture and handling increases stress and presents a risk of injury. See mitigations under Issue FI-2. During dewatering, water quality in the river would be protected (see FI-6 Water Quality Effects on Fish) and impacts mitigated as described in Section 4.3.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of rearing habitat for steelhead cannot be fully mitigated and would be significant.

Issue FI-6: Water Quality Effects on Fish

Short-term alteration of aquatic habitat
Determination: ***less than significant with mitigation, short-term***

IMPACT

Construction activities, river diversions and reservoir dewatering would affect turbidity, DO levels, and temperature in the river downstream of SCD during the summer low flow period. These effects may extend downstream for up to several miles.

Increases in turbidity could occur during installation of seasonal stream diversions, from dewatering stream channels and the plunge pool, from dewatering the reservoir, and from dewatering the reservoir sediment. Increased turbidity would occur during the time of the year when flows are low and the river normally sustains low levels of turbidity.

Increases in temperature could occur as a result of channel dewatering and reservoir dewatering. Reservoir dewatering would result in a shallow, warm pool of water in the bottom of the reservoir for a period before the reservoir is completely empty. Dewatering would occur in the early summer when air temperatures can already be warm.

Decreases in DO levels could occur as a result of dewatering channels and from reservoir dewatering. DO levels would be rapidly moderated by aeration at the release point and when aerated at downstream riffles.

During dewatering of the reservoir, turbidity levels would increase in the reservoir water from the mobilization of fine particulate organic matter and sediment on the reservoir bed. During dewatering, iron-rich pore water would surface and bring dissolved iron into contact with oxygen in the surface water. The iron would precipitate out in the water column, creating turbidity, and in the process consume oxygen in the water. These factors would increase turbidity in the reservoir water and in water being released into the Carmel River.

Experience from the Interim Dam Safety Measures (annual drawdowns) indicate that turbidity levels are generally less than 10 NTUs (for weeks or months) with short spikes (for hours to days) up to higher levels. The annual drawdowns lowered the reservoir level by 10 feet to elevation 515 and held the reservoir at that level for the remainder of the dry season by discharging inflow via the reservoir through the drawdown ports. The Proponent's Proposed Project would completely dewater the reservoir and divert the inflowing streams around the reservoir via bypass pipes. Once the reservoir is dewatered, there should be no reservoir water source of turbidity.

Turbidity levels in the reservoir are expected to be in the Behavioral or Sublethal Effects range for days to weeks. These effects could impair visual cues affect behavioral interactions and possibly disrupt feeding in the short-term. Turbidity during dewatering could affect Reaches 4, 5, and 6. Turbidity levels would attenuate in a downstream direction with the most pronounced effects in Reach 4 attenuating to minor or undetectable effects in Reach 6. Collectively these three reaches support about 40 percent of the total steelhead in the river and about 30 percent of the rearing habitat in the Carmel River downstream of LPD for days to weeks (Table 4.4-10). This would be a significant, short-term impact.

MITIGATION

Control of turbidity from construction activities on adjacent roads, stream crossings, and bridges is addressed in Section 4.1 and 4.3. Moderating the rate at which the reservoir is dewatered could mitigate turbidity from dewatering. During the annual drawdown, all inflow was allowed to flow through the reservoir and turbidity control was not practical or possible, except by moderating the rate of drawdown. During construction dewatering, the inflow would be piped around the reservoir and released into the downstream channel. The reservoir would be dewatered to 510 feet by pumps then lowered further by reopening the lower level valve. Dewatering would also occur, using well points once surface water is depleted. Releases from the reservoir into the river can be regulated to minimize the effect on downstream turbidity. If reservoir water is highly turbid, it would be treated by running it through a mobile filter plant prior to release to the river. Turbidity effects from the dewatering would be short-term and localized in the river downstream of SCD. Turbidity may affect Reach 4 and some of 5, but the ability to regulate and treat the release of highly turbid water from behind SCD would mitigate the effects to the river. Aerating the water prior to release into the river would mitigate decreased DO levels. Cooling the water prior to release into the river would mitigate increased temperatures.

Turbidity caused by dewatering the plunge pool would be regulated by the rate at which the plunge pool is pumped down. Typically, the highest turbidity occurs near the end of the dewatering process. It would also be possible to treat this water prior to release into the river in the same manner that the water in the reservoir would be treated.

Water temperature increases would be mitigated by dewatering the reservoir as much as possible during cool periods or during the early part of the day. As the water level is lowered and surface water temperatures rise during the day, dewatering would switch from a surface release to a release from well points. Surface water releases would be restricted to cooler periods at night or early in the day. River temperatures downstream of the Dam should not increase by more than 1 to 2 ºC over water temperature levels upstream of the sheet-pile diversion.

Reducing thermal loading in diversion pipes around the reservoir would be accomplished by placing the pipeline in locations that are shaded, burying the pipe beneath a shallow layer of sand or covering the pipe with shade cloth or burlap. The pipe would be painted white where it is not possible to shade or bury it.

DO levels would be mitigated through aerating the water either as it leaves the diversion pipes or with a mechanical aerator prior to releasing pumped or treated water into the river. Low DO levels in the reservoir would quickly moderate from water falling over the Dam. During bypass operations for the river, the design shall incorporate a feature that would aerate the water as it descends from the Dam to the river. The reservoir dewatering would make use of the surface release to aerate water. Water that is pumped from the reservoir or from well points would be discharged in a similar manner to fully aerate low DO water prior to discharge into the river.

While a substantial number of fish could be exposed to increased turbidity and water temperatures and reduced DO levels, the actions proposed would fully mitigate for the impacts. The level of impacts is mitigable to less than significant and any residual impact would be a short-term effect on the fish. Therefore the impact is less than significant with mitigation.

Issue FI-7: Fish Ladder Closure

Short-term limiting fish movement past the Dam site
Determination: ***less than significant, short-term***

IMPACT

Dewatering the reservoir during CY 4 may result in temporary closure of the fish ladder for a period of days to weeks toward the end of the migration season. Closure of the ladder would result in direct, temporary effect on adult steelhead in the Carmel River by stopping migration at the Dam. Based on migration information, the number of adult steelhead potentially affected by ladder closure could range from 0 to 13 fish during all of June (Table 4.4-2).

Construction would not begin until the Carmel River is diverted around the work area. The bypass system for the project can handle about 50 cfs, so reservoir dewatering and construction would not begin until the flows in the river at SCD are at 50 cfs or less. Flows would be diverted into the bypass pipes and the ladder would be closed. Bypass pipes would be designed to carry 50 cfs on the Carmel River and 10 cfs on San Clemente Creek. Construction activities requiring diversion of the river would begin on May 15 or the first day thereafter when flow passing San Clemente Dam is 50 cfs or less. The flow conditions and calendar start date imply it would be unlikely that any adult fish would still be moving up the river when the ladder would be closed. The ladder is usually closed in early to late May when flows recede in the river and the mouth closes. The ladder has operated in June only one year out of 15. In 1998 (a wet year) the fish ladder was able to operate in June when flows at the beginning of the month were well over 200 cfs (Figure 4.4-5).

Given these natural constraints, it is unlikely that the Proponent's Proposed Project would have any effect on upstream migrating adult steelhead. An analysis of the most recent 15 years of ladder operations shows that the ladder operation occurred during the May 1 to 15 period in 10 out of 15 years; during the May 16 to 31 period in 7 out of 15 years and occurred only for one year after June 1. A total of 21 fish ascended the ladder in May and June of 1998, the highest count of all the years for operations continuing after May 1 and represented 2.3 percent of the adult run for that year (Table 4.4-2). A total of 13 fish ascended the ladder in June of 1998 representing 1.5 percent of the adult run, and 8 fish representing 0.9 percent of the 1998 run ascended the ladder between June 16 and 30. The largest number of fish that ascended the ladder in May occurred in 1996 and 1997 when 11 fish ascended the ladder each year representing 2.5 percent of the run in 1996 and 1.4 percent of the run in 1997. In 1999 no fish entered the ladder in May and no fish entered the ladder during second half of May when it was operating in 2002 or 2005 (Table 4.4-2).

During the ten years that steelhead were counted in the ladder in May and/or June, a total of 59 fish passed up the ladder, representing 1.4 percent of the total of 5,609 fish that were counted in the ladder for those years (Table 4.4-7). While ladder closure may affect some fish, based on available data, ladder closure on May 31st for a single year would not prevent or interfere substantially with the movement of any native resident or migratory fish species.

In the Draft EIR/EIS, a Trap and Truck facility plan was proposed as a mitigation measure for fish that might pass through the ladder during May and June when the reservoir was being dewatered. The migration is essentially over when river diversion activities start after May 31. The level of impact to migrating adult steelhead from ladder closure would be less than significant. Therefore, the impact is less than significant, short-term. This is a change from the Draft EIR/EIS because of the date for stream diversion to begin has been deferred several weeks.

Issue FI-8: Upstream Fish Passage

Long-term impact to fish migrating to upstream spawning and rearing habitat
Determination: ***beneficial with mitigation, long-term***

IMPACT

The existing ladder would be demolished and a new vertical slot ladder would be constructed. Operation of the new ladder would improve passage conditions at SCD compared to the existing ladder for several reasons. The new ladder would increase the attraction flow at the ladder, would have more steps, which would reduce the height between steps compared to the existing ladder, and would have larger pools providing better resting habitat and the ladder design is a vertical slot design which would enable swim-through passage rather than the leaping passage between steps required by the existing ladder. Upstream passage would be improved since all flows less than 55 cfs would be conveyed down the ladder and not over the spillway. The present ladder can pass only 10 cfs. During spills, the ladder would carry up to about 77 cfs and would continue to provide upstream fish passage. The ladder could become impaired by sediment and debris transported from upstream and by the deposition of sediment behind The Dam and upstream of the ladder. The operation of a sluice gate could result in fallback of adult fish that have ascended the ladder and are entrained in the flow during sluice gate operation.

Operation of the new ladder would improve passage conditions at SCD, and would be a beneficial impact compared to existing conditions.

MITIGATION

The sluice gate would be operated under the protocols of the SOMP (Appendix J). The 10-foot diameter sluice gate would be installed near the ladder entrance and periodically operated to keep the ladder free of sediment and maintain passage conditions upstream of the ladder. Sluicing operations are defined in the SOMP, and sediment impacts are discussed in Issue FI-9a. Sluicing or dredging would occur as needed to maintain the ladder free of sediment and provide for passage through upstream river channels for adult fish. Sediment management would occur on a preventative basis under appropriate flows. Dredging and excavation would occur during low-flow periods. Sluicing would only occur on the rising limb of an early winter storm event. A gate would be installed on the upstream end of the fish ladder to prevent fish from moving out of the ladder before and during sluice gate operation. The fish ladder exit would be closed for a period of time before the sluice event begins. Fish would not be able to exit the upstream end of the ladder when the gate is closed which includes a period prior to and during the sluice event. Following completion of a sluice event, flows would again spill over the Dam. The gate at the upstream end of the ladder would be reopened to allow passage into the remnant reservoir and to access upstream river channels. Fish that are in the remnant reservoir prior to operation of the sluice gate could be subject to fallback through the sluice gate. The ladder would be closed prior to operation of the sluice gate to allow fish that had exited the ladder to move upstream away from the sluice gate. The sluice gate would be partially opened to eliminate resting habitat near the ladder exit and encourage steelhead in the remnant pool to move upstream away from the gate prior to fully opening the sluice gate. A few adult fish may be subject to fallback during the 2 hour period when the gate is fully open. Because of the changing nature of the Carmel River's flows and the experimental nature of early sluice gate operation, the SOMP is an adaptive management plan that would be modified by the Fish Passage Management Committee composed of representatives from CAW, NMFS, CDFG, and MPWMD.

With mitigation, the new ladder and sluice gate operations, would improve upstream fish passage conditions at SCD and would have a beneficial effect compared to existing operations.

Issue FI-9a: Sediment Impacts to Downstream Channels from Sluicing, Dredging or Sediment Transport Downstream

Long-term alteration of aquatic habitat
Determination: ***less than significant, long-term, no mitigation required***

Issue FI-9 as identified in the Draft EIR/EIS has been designated as FI-9a in the Final EIR/EIS to separate the analysis of downstream sediment impacts from sluicing, dredging, or sediment transport from the impacts to fish due to excavation or dredging in the remnant reservoir for fish passage (presented as Issue FI-9b).

IMPACT

This impact was listed as FI-9 in the Draft EIR/EIS and had the impact determination "significant unavoidable." Based on the additional analyses on suspended sediment levels from sluicing to downstream channels that was conducted in response to comments, the impact determination has been changed to "less than significant." The additional studies are presented earlier in this section and the results are further discussed in the following paragraphs.

The Proponent's Proposed Project would retain the Dam and construct an improved fish ladder. Sediment has nearly filled the reservoir at SCD and is expected to fill the reservoir to the spillway elevation in 6 to 10 years. Fine sediment would begin spilling over the Dam during large flow events. Initially, only fine sediment would be delivered to the downstream river reaches. However, substrate size is expected to increase to include gravel-sized material within 12 to 20 years. An estimated average 16.5 AF of sediment is delivered to the San Clemente reservoir area annually and about 12 AF of that sediment would be transported downstream (MEI 2003).

In order to keep an open channel between the top of the fish ladder and the upstream river, construction and operation of a sluice gate would be employed. The sluice gate would be 10 feet in diameter and situated so the opening would be about 10 feet from the entrance to the fish ladder. The bottom of the sluice gate would be about 2.7 feet below the invert elevation of the fish ladder. The sluice gate would be operated according to protocols set forth in the SOMP (Appendix J). Sluicing events would only occur during winter storm runoff when the river is already turbid from high flows. Adequate fish passage conditions are defined as a minimum of one foot of depth in the channel upstream of SCD.

Sediment management protocols employ dredging or excavation during low flow periods to avoid sluicing under these conditions to provide for fish passage in advance of the time when storm flows in the river flow reach 300 cfs. Under the sluicing protocols, sediment sluicing operations would open the sluice gate for two hours and release about 2.4 acre feet of sediment. This would cause a short-term increase in the suspended sediment load of fine-to-coarse sand-sized material to the river. No alteration of water temperature would be expected from sluicing operations.

The change in suspended sediment delivered to the lower river for existing conditions and the Proponent's Proposed Project would remain in the Sublethal Effects Level with SEV scores of 7 to 8 in all reaches downstream of SCD for a typical wet year sluice event (Table 4.4-9). The Sublethal Effects Level would include reduced feeding success, delayed hatching and indications of physiological stress and poor condition (Newcombe and Jensen 1996).

Subsequent flows of 300 cfs or more following closure of the sluice gate have adequate transport capacity in the Carmel River downstream of SCD to fully mobilize the sluiced sediment and move it downstream (Appendix S). Organisms in the river downstream would experience periods of increased suspended sediment as the material passes downstream. Graphic analysis of suspended sediment concentrations show a rapid increase in suspended sediment in Geomorphic Subreach 4.3a with attenuation of the peak and dispersal downstream to subreaches 4.3b and 4.3c (Appendix O Figures 11 to 14) for a wet year sluice event. The dry year sluice event shows a somewhat similar behavior but because of lower flows following the sluice event, suspended sediment levels would stay elevated in Subreach 4.3b and 4.c at the end of four days (Appendix O Figures 25 to 28).

Suspended sediment concentrations would increase in Subreach 4.3 (upstream section of Fishery Reach 4) for about 2-3 days (Figure O-1, Appendix O), and in Fishery Reaches 5, 6, and the upper half of 7 of the Carmel River compared to 2030 Baseline Conditions. Suspended sediment effect levels remain the same for the Proponent's Proposed Project compared to the existing conditions for subreaches 4.3, 6.3, 6.7, 7.3, 7,7 and 9, and does not change the effect level from sublethal. Suspended sediment effect levels are the same with slightly higher concentrations but similar duration (See Figures O-3 through O-9, Appendix O) with an SEV of 8 for the Proponent's Proposed Project compared to the 2030 Baseline for subreaches 6.3, 6.7, 7.3, 7.7 and 9. Suspended sediment effect levels are 8 for the Proponent's Proposed Project compared to 7 for the 2030 Baseline in Subreach 4.3 (higher concentration, similar duration see Figures O-1 and O-2) but this does not change the effect level from sublethal.

Suspended sediment would affect fishery reaches 4, 5, 6, and, 7 with the greatest effects on Fishery Reach 4 and progressively lesser effects to downstream sites.

The analysis based on a change in Effects Level indicate that the effects from suspended sediment released by sluicing under the Proponent's Proposed Project are similar to effects of background levels of suspended sediment that already occur in the river during high flow events or would be expected to occur in the river under the 2030 Baseline condition (with the reservoir completely full of sediment except for a remnant pool).

Impacts from exposure to suspended sediment from the Proponent's Proposed Project to downstream resources are similar to impacts that occur during storm events under the 2030 Baseline and therefore are less than significant long-term.

Issue FI-9b: Impacts to Fish from Excavation or Dredging of Sediment for Fish Passage

Potential juvenile fish entrainment and mortality
Determination: ***less than significant, long-term***

IMPACT

In response to comments, since issuance of the Draft EIR/EIS, the SOMP (Appendix J) has been expanded to include other methods for managing sediment, in addition to sluicing. Mechanical sediment removal using a suction dredge or an excavator would be employed to maintain fish passage upstream of the ladder when sluicing sediment is not possible because of potential downstream impacts. Excavation or dredging would be conducted under low flow conditions and not during periods of peak steelhead migration. Recently deposited fine grained substrates impeding fish passage would be removed from the area upstream of the ladder.

Suction dredging can entrain and kill small fishes and invertebrates, degrade benthic habitat, and increase turbidity in a localized area. The bottom habitat that would be dredged consists of a generally flat bottom of fine sediments that have recently accumulated behind the Dam and would be of very poor habitat quality. These fine sediments would support very low invertebrate productivity and collectively the area would provide very poor rearing habitat. Excavation with a mechanical excavator could kill fish by striking them with the bucket, capturing fish in the bucket or exposing fish in the area of the excavation to turbulence and localized elevated turbidity. During dredging or excavation, flow through the fish ladder would be minimized and most of the flow would be spilled over the Dam. Reducing flow into the ladder would minimize the amount of suspended sediment from removal activities from entering the ladder flow. While there is a potential for juvenile steelhead to be entrained in the suction dredge and killed, this potential is very low. The intake for the dredge is operated in the substrate and would rarely encounter steelhead. Additionally, juvenile and adult fish are known to easily avoid suction dredges (Harvey and Lisle 1998). Juvenile steelhead are not likely to be found in the area to be excavated because habitat conditions would be very poor, water depth would be shallow, substrate would be sand, velocities would be low, and the area would be devoid of cover.

Given the poor habitat for steelhead in the area requiring dredging, the ability of steelhead to avoid suction dredges and/or a bucket, the low probability of encountering steelhead in the area, and excavation activities that would only occur for a period of days, this would be a less than significant, long-term impact.

Issue FI-10: Relocate CAW Water Diversion Upstream

This issue does not apply to the Proponent's Proposed Project.

Issue FI-11: Fish Screen Installation

Long-term elimination of entrainment or impingement at the diversion
*Determination: **beneficial, long-term***

IMPACT

A new fish screen meeting NMFS and CDFG criteria would be installed at the intake in SCD. The intake would be moved to a location that would be in proximity of the sluice gate. The fish screen would eliminate entrainment into the diversion and minimize impingement. Sluice gate operation for fish passage as described in FI-9a (Sediment Impacts to Downstream Channels from Sluicing, Dredging or Sediment Transport Downstream) would also maintain the intake in operational condition.

MITIGATION

The impact of the fish screen is beneficial; no mitigation is required. Mitigation for the sluice gate operation is described in Issue FI-9a.

Issue FI-12: Downstream Fish Passage over SCD

Long-term improvement to fish passage over the Dam
*Determination: **beneficial, long-term***

IMPACT

The spillway would be modified by raising the elevation of the two lateral spillway bays by 0.5 feet relative to the center bay. Spillways would be extended to directly spill into the plunge pool, and not strike the thickened dam face. During low flows, all surface flow would be carried through the fish ladder (up to 55 cfs). At flows above 55 cfs, surface flow would begin to spill through the center spillway bay. For stream flows in the range of approximately 55 to 115 cfs, most of the flow (55 to 62 cfs) would pass through the ladder. The remaining flow would spill over the lower, center spillway (elevation 525.0). Above stream flows of approximately 115 cfs, spill would also occur at the higher two spillway segments (elevation 525.5 feet). This configuration provides an increased depth of flow during lower flows compared to the existing spillway and ladder configuration. The new spillway bays would be equivalent to or better than the existing spillway bays for fish passage. Fish passing over the Dam would fall about 65 feet into the plunge pool, as they do under existing conditions. The new fish ladder would pass all flows up to about 55 cfs, reducing the amount of time the reservoir spills and providing safer passage down the ladder. The ladder would continue to operate during higher flows and would carry up to about 77 cfs when river flow volume is about 700 to 800 cfs or higher. Sluicing events would occur as needed and be consistent with conditions in the SOMP (Appendix J) when it is necessary to mobilize sediment from upstream of the dam and fish ladder. Sluicing would occur for up to 2 hours during storm flows of 300-700 cfs. During the sluice event nearly all flow would pass through the sluice gate with a small volume of flow going down the ladder. Juvenile and adult fish entrained in the sluice event would pass downstream through the sluice gate into the plunge pool. Water levels behind the dam would drop below the level of the spillway during the sluice event preventing juvenile and adult fish from passing through the spillway bays. There is potential for juvenile and adult fish passing downstream through the sluice gate and into the plunge pool to become injured by the turbulence and shear zones as they enter the plunge pool. Potential injury from downstream passage while sluicing is occurring is not expected to be substantially different from potential injury that would occur as a result of passage through the spillway bays and the fall into the plunge pool. This would be a beneficial, long-term impact.

MITIGATION

Spillway and fish ladder modifications described above would improve downstream fish passage compared to existing conditions. No mitigation is required.

Issue FI-13: Stream Sediment Removal, Storage, and Associated Restoration

Sediment removal is not a component of the Proponent's Proposed Project and no stream restoration would occur. Except for local removal of sediment for construction purposes, existing conditions would be unchanged. Table 4.4-11 provides a summary of changes to fish habitat and changes to lengths of channel by alternative.

Table 4.4-11: Summary of Channel Length Changes for the Proponent's Proposed Project and Each Alternative Upstream of San Clemente Dam

	Habitat Changes		Gain or Loss of Channel Length		
	San Clemente Creek	Carmel River	San Clemente Creek	Carmel River	Net Change
Existing Conditions	1,350 feet of channel, creek mouth is 850 feet U/S from SCD*	6,500 feet of channel, river mouth is 200 feet U/S from SCD	No Change	No Change	0ft
Proposed Project	No change	No Change	0 feet	0 feet	0 feet
Alternative 1 Dam Notching	Remove sediment in San Clemente Creek arm to a depth of 20 feet; remove 1,350 feet of existing SCC channel. Reconstruct 2,200 feet of SC Creek channel on new sediment surface.	Remove sediment in Carmel River arm to a depth of 20 feet, remove 6,500 of existing CR channel, Reconstruct 6,700 feet of new CR channel on new sediment surface	Gain 850 ft of channel length	Gain 200 feet of channel length	Gain 1,050 feet of channel length
Alternative 2 Dam and Sediment Removal	Remove all sediment in San Clemente Creek arm to valley bottom; remove 1,350 feet of existing SCC channel. Reconstruct 2,200 feet of SC Creek channel in new valley bottom.	Remove all sediment in Carmel River arm to valley bottom, remove 6,500 of existing CR channel, Reconstruct 6,700 feet of new CR channel in new valley bottom	Gain 850 ft of channel length	Gain 200 feet of channel length	Gain 1,050 feet of channel length
Alternative 3 Reroute and Dam Removal	Remove all sediment in San Clemente Creek arm to valley bottom; remove 1,350 feet of existing SCC channel. Reconstruct 2,200 feet of Carmel River Channel through San Clemente Arm in valley bottom.	Abandon 3,000 feet of Carmel River Channel, construct 450 feet of bypass channel and connect with San Clemente Arm channel.	Loss of 1,350 feet of channel length	Old Channel length was 3,000 feet, new channel constructed is 2,650 feet, = loss of 350 feet channel	Loss of 1,350 feet of San Clemente Creek and 350 feet of Carmel River. Net loss of 1,700 feet of channel.
Alternative 4 No Project	Same as Existing conditions		Same as Existing Conditions		

* all distances measured from dam to upstream extent of former Inundation Zone and assumes 850 ft for San Clemente Creek and 200 ft for Carmel River beneath the reservoir.

Issue FI-14: Notching Old Carmel River Dam

Short-term loss of rearing habitat, Improvement of fish passage
Determination: ***short-term, less than significant; long-term, beneficial***

IMPACT

The OCRD would be notched in CY 3. Sheet piles would be installed upstream and downstream around the central portion of the Dam. The sheet pile installation will isolate the demolition area from the river so the plunge pool downstream of the OCRD would not be dewatered and the river would not be diverted around the site. Once the sheet piles have been set, the water on the downstream side would be pumped out and bed material from the upstream side of the Dam would be excavated as the Dam is notched. Flow in the river in the late summer or early fall would be on the order of 10 cfs or less. During CY 3 or CY 4, steelhead captured from the upstream work at SCD and reservoir would be released well downstream of OCRD (See FI-2, FI-4, and FI-5). This would minimize the number of steelhead in the river at OCRD.

In the Draft EIR/EIS, mitigation was proposed for this impact which would include fish rescue activities because of dewatering of the plunge pool downstream of the OCRD. However, current plans would not involve dewatering of the pool below OCRD. Impacts would be minimal due to: late season low flow conditions; minimal disruption in the river channel from isolating the work using sheet piles; the short duration of the project; and because juvenile steelhead migrating downstream would be moved to river sites well below OCRD for the summer period preceding dam notching work at the OCRD. Construction of the notch would result in a less than significant, short-term impact. Notching would remove a large center section of the Dam and eliminate a passage barrier and would be long-term benefit.

MITIGATION

No Mitigation is required. This would be a less than significant short-term impact and notching would result in a long-term benefit.

Issue FI-15: Sleepy Hollow Steelhead Rearing Facility

Loss or degradation of water supply
Determination: ***less than significant with mitigation, long-term***

IMPACT

The SHSRF depends on Carmel River water to operate from early summer to winter or early spring. Construction and operation of the Proponent's Proposed Project could result in water of poor quality, (high turbidity, low DO, or warm temperatures) during CY 3 and 4 and during operations into the future. Road construction, dewatering the plunge pool, diverting water around the reservoir and dewatering the reservoir could affect water quality at the SHSRF. Sediment delivered to the river below SCD from sluicing or from sediment transported over the Dam could affect water quality for the SHSRF. This would be a significant long-term impact.

MITIGATION

An alternative water supply would be made available to the SHSRF. Water can be pumped up from the Russell Wells and be made available to the SHSRF as an alternative water supply during construction years, or during periods of excessive turbidity or sediment levels in the Carmel River. With mitigation, this would be a less than significant, long-term impact.

4.4.3.2 Alternative 1 (Dam Notching)

Aquatic biology and fisheries impacts and mitigation for Issues FI-3 (Operation of Trap and Truck Facility at ORCD), FI-6 (Water Quality Effects on Fish), FI-8 (Upstream Fish Passage), FI-9a (Sediment Impacts to Downstream Channels from Sluicing, Dredging, or Sediment Transport Downstream), FI-9b (Impacts to Fish from Excavation or Dredging of Sediment for Fish Passage), FI-11 (Fish Screen Installation) and FI-15 (Sleepy Hollow Steelhead Rearing Facility) would be the same as described for the Proponent's Proposed Project. Issue FI-14 (Notching Old Carmel River Dam) would be the same as described for the Proponent's Proposed Project except notching would occur in CY 6.

Issue FI-1: Access Route Improvements

Access route improvements (short-term alteration of aquatic habitat)
Determination: ***less than significant with mitigation, short-term***

IMPACT

The existing San Clemente Drive would serve as a secondary access road to reach the Dam. No Tularcitos Access Road would be constructed. Road improvements would be similar along the Carmel River between the Sleepy Hollow Ford and the OCRD and between the OCRD and SCD therefore impacts would be similar to the Proponent's Proposed Project for FI-1 except there would be no Tularcitos Creek impacts.

The main access route would be via Carmel Valley Road and Cachagua Grade then via the improved Jeep Trail to the sediment disposal area. A new temporary road will be constructed to access the reservoir. The Cachagua Access Route is located some distance from the river. Access to the reservoir would not occur until it was dewatered. Therefore there is no impact from this access route.

MITIGATION

Mitigation would be similar to the Proponent's Proposed Project but to a lesser extent because access route improvements under Alternative 1 would not include impacts to Tularcitos Creek and the associated riparian habitat. With mitigation, this would be a less than significant, long-term impact.

Issue FI-2: Dewatering River Channels for Construction Purposes

Short-term loss of aquatic habitat
Determination: ***significant, unavoidable, short-term***

IMPACT

The plunge pool immediately downstream of SCD would be dewatered to facilitate dam notching in the same manner as in the Proponent's Proposed Project except that it would occur during CY 4 and would not involve Tularcitos Creek.

MITIGATION

Mitigation actions are the same as the Proponent's Proposed Project FI-2 (Dewatering River Channels for Construction Purposes), except they would not include Tularcitos Creek and would occur in CY 4.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead cannot be fully mitigated and would be significant.

Issue FI-4: Diversion of Carmel River and San Clemente Creek for Construction Purposes

Short-term loss of aquatic habitat
Determination: ***significant, unavoidable, short-term***

IMPACT

Impacts would be similar to those described for the Proponent's Proposed Project Impact FI-4 (Diversion of Carmel River and San Clemente Creek for Construction Purposes), but diversions would occur over longer distances and for two consecutive construction years.

The diversions would have direct, short-term impacts to rearing habitat upstream of the reservoir for about 5,200 feet in the Carmel River and for about 1,350 feet in San Clemente Creek during CY 4 and CY 5. This would affect rearing habitat for up to about 3,480 juvenile steelhead in the Carmel River and 600 juvenile steelhead in San Clemente Creek, or about 3.1 percent of juveniles in the river and represent about 5.2 percent of the habitat downstream from LPD (Table 4.4-10). These impacts would occur for two years during CY 4 and CY 5 and would be short-term, significant impacts.

MITIGATION

Mitigation measures would be the same as for the Proponent's Proposed Project, except fish rescues would occur for two consecutive years along 5,200 feet of the Carmel River and 1,200 feet of San Clemente Creek upstream of the Dam.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead during 2 construction years cannot be fully mitigated and would be significant.

Issue FI-5: Reservoir Dewatering

Short-term loss of aquatic habitat
Determination: ***significant, unavoidable, short-term***

IMPACT

Impacts would be similar to those described for the Proponent's Proposed Project, and would include lowering the reservoir approximately 21 vertical feet to facilitate sediment removal and dam notching. Lowering the water level to 504 feet would completely dewater the reservoir. The reservoir would be dewatered three times, once in CY 4, 5,and 6. The reservoir would store about 500 AF of water between CY 4, 5, and 6 and would affect hydrology of the Carmel River in late fall/early winter (see Section 4.2 Hydrology). These hydrologic effects would occur during reservoir filling and again in the spring during the dewatering and would affect movement of steelhead in the Carmel River. At the beginning of the wet season there would be about 500 AF of storage in the reservoir that would need to be filled before the Dam would spill. In the spring months, the 500 AF in storage would be released through the drawdown ports or the slide gate at the 494-foot elevation, increasing flows for a short time in the river downstream of SCD. Flows would be managed to begin bypass flow around the reservoir by May 31[t] or the first day when the flow passing San Clemente Dam is 50 cfs or less and dewatering of the reservoir would begin soon after.

Direct, temporary impacts to fish in the reservoir would occur from draining the reservoir CY 4, 5, and 6. The reservoir would store up to 500 AF of water at the end of year four and would affect flows in the lower river from one day to eight weeks depending on the water year type until the reservoir fills (ENTRIX 2000). Release of the 500 AF during the start of CY 5 would occur at a time when some adult steelhead would be actively moving downstream.

The direct effects to aquatic habitat during reservoir dewatering would create significant, unavoidable impacts to steelhead resources in the San Clemente Reservoir, resulting in a loss of rearing habitat in the reservoir during CY 4, 5, and 6 Impacts would occur for three consecutive construction seasons and result in greater impacts than the Proponent's Proposed Project. This is a significant, short-term impact.

MITIGATION

Mitigation measures would be the same as for the Proponent's Proposed Project, except that fish rescues would occur for two consecutive years. Mitigation for operation of a 500 AF reservoir would be provided by maintaining upstream passage through the fish ladder through May 31 or the first day when the flow passing San Clemente Dam is 50 cfs.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead for three construction years cannot be fully mitigated and would be significant.

Issue FI-7: Fish Ladder Closure

Short-term limiting fish movement past the Dam site
Determination: ***less than significant, short-term***

IMPACT

See issue FI-7 under the Proponent's Proposed Project for a discussion of the issues and analysis of the impacts. Under Alternative 1, the fish ladder would be closed near or after the end of the migration season in CY 4, 5, and 6. This would be a less than significant, short-term impact.

Issue FI- 8: Upstream Fish Passage

Long-term impact to fish migrating to upstream spawning and rearing habitat
Determination: ***beneficial with mitigation, long-term***

IMPACT

The existing ladder would be demolished and a new, shorter vertical slot ladder would be constructed. Impacts associated with operation of the new ladder are the same as those presented under the Proponent's Proposed Project, except that the ladder would be reduced in length by about 19 vertical feet. The ladder would be operated consistent with the SOMP in Appendix J.

Operation of the new ladder would improve passage conditions at SCD and would be a beneficial impact compared to existing conditions.

MITIGATION

Mitigation is the same as describe in FI-8 for the Proponent's Proposed Project. This would be a long-term benefit.

Issue FI-10: Relocate CAW Water Diversion Upstream

Long-term reduction of flow in reaches of Carmel River between the new diversion point and dam
Determination: ***less than significant with mitigation, long-term***

IMPACT

Relocating the water supply diversion intake 7,200 feet upstream on the Carmel River from current dam site would reduce flow in the river between the diversion intake and the Dam site compared to existing conditions. Downstream flows (below the Dam) would not be affected by this change. This would be a significant long-term impact.

MITIGATION

Minimum flows are addressed in the current MOU between MPWMD, CDFG, NFMS, and CAW. Minimum flows are based on available upstream storage in Los Padres Reservoir, the water year type and water demand. A similar plan would be developed in conjunction with NMFS Fisheries, CDFG, SWRCB, and the MPWMD to provide flows for steelhead habitat in the reach of the river affected by the new point of diversion. Terms of the new plan would avoid impacts to the river resulting from moving the diversion upstream. With this mitigation, relocation of the CAW water diversion would have a less than significant long-term impact.

Issue FI-12: Downstream Fish Passage over SCD

Long-term improvement to fish passage over the Dam
Determination: ***beneficial, long-term***

IMPACT

The improved ladder would be similar to the ladder improvements for the Proponent's Proposed Project. The Dam would be lowered by about 20 feet and the height of the fall would be reduced from about 65 feet to 45 feet. This would be a benefit to downstream passage. The notch would be cut in the Dam at an elevation where the Dam is thicker resulting in a longer spillway. Passing through a longer spillway would increase exposure of fish to potential contact with the spillway surface. Direct long-term impacts to fish passing over the Dam would occur from abrasions against the spillway as they pass downstream. The shorter drop to the plunge pool would be an improvement compared to existing conditions and the Proponent's Proposed Project; however, the fall to the plunge pool may still injure or kill some larger fish. However, the overall impact would still be beneficial, long-term.

MITIGATION

The reduced height from the Dam crest to the plunge pool is an improvement compared to existing conditions and to the Proponent's Proposed Project. A low flow channel would be created within the notched spillway to increase depth of flow and reduce the potential to contact the spillway surface. The new, shorter ladder would pass a greater volume of flow and reduce the amount of time that flow would move spill over the Dam.

This would be a long-term benefit.

Issue FI-13: Stream Sediment Removal, Storage, and Associated Restoration

Long-term reduction of aquatic habitat, short-term alteration of aquatic habitat
Determination: ***significant, unavoidable, short-term, less than significant with mitigation, long-term***

IMPACT

Approximately 6,500 feet of the Carmel River and about 1,350 feet of San Clemente Creek would become unavailable as rearing habitat for the three years it would take to remove sediment from the reservoir and notch the Dam. Existing channels would be eliminated during CY 4 as sediment is removed from the inundation area. Sediment removed from the reservoir would be stored at Site 4R – area upland and away from the reservoir and river. The channels would be flooded during the winter between CY 4 and

CY 5. During CY 6, geomorphically appropriate channels would be reconstructed and re-vegetated in about 6,700 feet of the Carmel River and 2,200 feet of San Clemente Creek (Table 4.4-11). The long-term loss of steelhead habitat would be an unavoidable significant impact.

MITIGATION

New channels for the Carmel River and San Clemente Creek would be reconstructed through the newly exposed sediments. The channels would be rebuilt with gravel, cobble and boulder materials salvaged during sediment removal. Channels would be geomorphically appropriate to the new valley gradient and substrate sizes. The channels would be re-vegetated with native trees and shrubs. Approximately 6,700 feet of channel would be constructed in the Carmel River and about 2,200 feet in San Clemente Creek. Full recovery to functional channels may take from 3 to 7 years after restoration is completed. Because the impact lasts beyond the construction period, this would be a significant, long-term impact. Following full recovery, the impact would be reduced to less than significant.

4.4.3.4 Alternative 2 (Dam Removal)

Aquatic and fisheries impacts and mitigation for Impacts and mitigation for Issues FI-3 (Operation of a Trap and Truck Facility at ORCD), FI-6 (Water Quality Effects on Fish), FI-11 (Fish Screen Installation) FI-14 (Notching Old Carmel River Dam), and FI-15 (Sleepy Hollow Fish Rearing Facility) would be the same as described for the Proponent's Proposed Project except notching of OCRD would occur during CY 6*. Impact Issues FI-1, (Access Route Improvements) and FI-10 (Relocate CAW Water Diversion Upstream), would be the same as Alternative 1. Impact Issues FI-9b (Impacts to Fish from Excavation or Dredging of Sediment for Fish Passage) and FI-12 (Downstream Fish Passage over SCD) would not apply to this alternative.*

Issue FI-2: Dewatering River Channels for Construction Purposes

Short-term loss of aquatic habitat
Determination: ***significant, unavoidable, short-term***

IMPACT

The plunge pool immediately downstream of SCD would be dewatered, to facilitate dam removal, in the same manner as in the Proponent's Proposed Project except that it would occur during CY 6.

MITIGATION

Mitigation actions are the same as the Proponent's Proposed Project FI-2 (Dewatering River Channels for Construction Purposes), except they would not include Tularcitos Creek and would occur in CY 6.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead cannot be fully mitigated and would be significant.

Issue FI-4: Diversion of Carmel River and San Clemente Creek around San Clemente Reservoir for Construction Purposes

Short-term loss of aquatic habitat
*Determination: **significant, unavoidable, short-term***

IMPACTS

Impacts would be similar to those described for Alternative 1, except the stream channels would be out of production for three construction seasons. The length of stream diversions would be the same as for Alternative 1. This would be a significant, unavoidable impact because of the loss of seasonal rearing habitat.

Loss of habitat in the Carmel River would affect about 3,800 juvenile steelhead and about 1,100 juvenile steelhead from San Clemente Creek. This represents about 6.2 percent of the total steelhead in the river below LPD. This loss of production would occur for three construction seasons.

MITIGATION

Mitigation measures would be the same as Alternative 1, except they would occur for three years during the construction season.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the temporary loss of habitat for steelhead for 3 construction years cannot be fully mitigated and would be significant.

Issue FI-5: Reservoir Dewatering

Short-term loss of aquatic habitat
*Determination: **significant, unavoidable, short-term***

IMPACT

Impacts resulting from reservoir dewatering would occur in CY 4, 5, and 6 and would be similar to those described for Alternative 1 except that in CY 5, the reservoir would be excavated down to 480 to 500 feet in elevation and in CY 6, the sediment would be excavated down to the original bed of the river, around elevation 460 feet at the Dam. This would be a significant, unavoidable impact because of the loss of seasonal rearing habitat in the reservoir. At the end of the CY 5, the reservoir would hold about 1,000 AF of water before it would spill, potentially affecting habitat conditions downstream in the Carmel River and possibly delaying the downstream migration of juvenile steelhead until the Dam spills.

Impacts would be similar to those described for Alternative 1 FI-5 (Reservoir Dewatering), except the reservoir would be lowered by about 21 vertical feet to facilitate sediment removal in CY 4. Lowering the water level to 504 feet would completely dewater the reservoir. The reservoir would be drawn down three times, once in CY 4, 5, and 6. This would be a significant, unavoidable impact due to the temporary loss of habitat for steelhead.

Operation of a 500 AF reservoir between the second and third construction seasons would be the same as Alternative 1.

Operation of a 1000 AF reservoir between the third and fourth construction seasons would affect the hydrology of the Carmel River in late fall/early winter (see Section 4.2) during refill. These hydrologic effects would occur again in the spring during the dewatering and would affect habitat in the lower river for steelhead. At the beginning of the wet season there would be about 1000 AF of potential storage in the reservoir that would need to fill before the Dam would spill. During late spring, the 1000 AF in storage would be released through the slide gate at 494-foot and 456-foot elevations, potentially affecting steelhead habitat conditions in the river downstream of the Dam.

Short-term impacts to fish in the reservoir would occur from draining the reservoir at the start of the second, third and fourth construction seasons. The reservoir would store up to 500 AF of water at the end CY 4 and would affect flows in the lower river from one day to eight weeks, depending on the water year, until the reservoir fills (ENTRIX 2000). Release of the 500 AF during the start of CY 5 would occur after the end of the steelhead migration season. The reservoir would store up to 1000 AF of water at the end of CY 5 and would affect flows in the lower river from one day to eight weeks, depending on the water year, until the reservoir refills (ENTRIX 2000). Release of the 1000 AF during the start of CY 6 would occur at a time after the end of the steelhead migration season.

Loss of reservoir rearing habitat is estimated to eliminate habitat for an unknown number of juvenile steelhead. This loss would occur for three construction years.

The direct effects to aquatic habitat during dewatering would be a significant, unavoidable impact to steelhead resources in San Clemente Reservoir resulting in a loss of rearing habitat in the reservoir during CY 4, 5, and 6. Short-term impacts would be greater than the Proponent's Proposed Project because the reservoir would be drained for three consecutive years.

MITIGATION

Mitigation measures would be the same as for the Proponent's Proposed Project Mitigation Measure FI-5 (Reservoir Dewatering), except that fish rescues would occur for three consecutive years. Mitigation for operation of a 500 AF and 1000 AF reservoir in CY 5 and CY 6 respectively would be provided by maintaining upstream passage through the fish ladder during the entire migration season.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead for three construction years cannot be fully mitigated and would be significant.

Issue FI-7 Fish Ladder Closure

Short-term limiting fish movement past the Dam site
Determination: ***less than significant, short-term***

IMPACT

See issue FI-7 under the Proponent's Proposed Project for a discussion of the issues and analysis of the impacts. Under Alternative 2, the fish ladder would be closed near or after the end of the migration season in CY 4, 5, and 6. This would be a less than significant, short-term impact.

Issue FI-8 Upstream Fish Passage

Long-term impact to fish migrating to upstream spawning and rearing habitat
Determination: ***beneficial, long-term***

IMPACT

Removal of the Dam and reservoir would eliminate the unnatural obstruction to migration at the Dam and reservoir site.

MITIGATION

This is a beneficial impact. No mitigation is required.

Issue FI-9a: Sediment Impacts to Downstream Channels from Sluicing, Dredging or Sediment Transport Downstream

Long-term loss of aquatic habitat
Determination: ***significant, unavoidable in the short-term, beneficial long-term***

Issue FI-9 as identified in the Draft EIR/EIS has been designated as FI-9a in the Final EIR/EIS to separate the analysis of downstream sediment impacts from sluicing, dredging, or sediment transport from the impacts to fish due to excavation or dredging in the remnant reservoir for fish passage (presented as Issue FI-9b).

IMPACT

Alternative 2 would remove the Dam and most of the sediment behind it. Fish in the river downstream of the Dam would be exposed to some sedimentation during the winter CY 4, 5, and 6, but most of the sediment would be retained within the newly excavated reservoir. Most potential sediment impacts would occur after dam removal is completed in the winter CY 6. Pre-dam sediment transport rates would be restored to the river downstream of the Dam site for the first time in over 80 years. At the end of the 41-year simulation, deposited sediment would increase bed elevation, sediment volume and gravel volume in all subeaches except 8.3 and 8.7. Additional gravel would improve habitat for fish and aquatic invertebrates throughout the Carmel River from the Dam downstream through Subreach 7.7.

There would be an initial large volume of fine sediment released from the exposed former inundation area. Suspended sediment modeling indicated this alternative would attain an SEV of 8 in subreaches 4, 6, and 7 and attain an SEV of 9 in Subreach 5. An increase to an SEV of 9 would be a significant impact because it shifts the Effects Level from Sublethal Effects to Lethal and Paralethal Effects. Fishery Reach 5 makes up about 9 percent of the steelhead and 5.3 percent of the juvenile rearing habitat downstream of LPD.

Compared to the existing conditions with an SEV of 7 in all subreaches, Alternative 2 scores are higher for subreaches 4.3 to 7.3 with an SEV of 9 for Subreach 5 and an SEV of 8 for the other subreaches. Compared to the 2030 Baseline with an SEV of 8 in subreaches 6.3 through 9, Alternative 2 is the same for subreaches 6.3, 7.3 and 7.7 and is lower (SEV of 7 compared to 8) for the subreaches 8.3 though 9. Subreaches 4.3 and 4.7 for Alternative 2 have an SEV of 8 compared to 7 for the 2030 Baseline; Subreach 5 has an SEV of 9 compared to 7 for the 2030 Baseline.

Fishery Reaches 4 through 7 support about 49,200 juvenile steelhead representing about 60 percent of the total juvenile steelhead and about 42 percent of the rearing habitat in the river downstream of LPD.

MITIGATION

BMPs for erosion control (SWPPP, Appendix K) and revegetation (Botanical Resources Plan, Appendix U) would be implemented in the reservoir zone during CY 6 as the Dam is being demolished. BMPs are described in Appendix K for erosion and Appendix U for revegetation. The channels through the former reservoir site would be restored to a geomorphically correct form. Sediment transport would be restored to the Carmel River downstream of the former dam site. The mitigation measures would reduce the impacts. However, the overall impact would remain significant and unavoidable in the short-term. Restoring historic sediment transport rates through the reservoir would eventually improve habitat conditions in the lower Carmel River and would be beneficial in the long-term.

Issue FI-13: Stream Sediment Removal, Storage and Associated Restoration

Long-term reduction of aquatic habitat, short-term alteration of aquatic habitat
Determination: ***short-term, significant, unavoidable; long-term, beneficial***

IMPACT

Sediment excavation impacts would be similar to those described for Alternative 1, although a larger volume of sediment would be moved and impacts would occur CY 4, 5, and 6. This would cause a temporary loss of steelhead habitat in the reservoir area.

As mitigation, the dewatered Carmel River and San Clemente Creek would be restored during CY 6 as the Dam is removed as mitigation. This would be a significant impact.

MITIGATION

As part of Alternative 2, both the Carmel River and San Clemente Creek would be completely rebuilt with gravel, cobble and boulder materials salvaged during sediment removal. Channels would be restored to mimic their historic condition. The buried channels would be exhumed during the sediment removal process. Restoration of the channels would be based upon the uncovered topography and a geomorphic understanding of appropriate channel dimensions, considering substrate size, gradient, and valley width. The restored channel length would be similar to the channel lengths that existed prior to the construction of SCD. These activities would restore about 6,700 feet of Carmel River channel and about 2,200 feet of San Clemente Creek channel (Table 4.4-11). Riparian zones along the restored channels would be re-vegetated with native trees and shrubs. However, with mitigation, this would be a significant short-term impact but would be a long-term benefit.

Alternative 3 (Carmel River Reroute and Dam Removal)

Aquatics and fisheries impacts and mitigation for Issues FI-3 (Operation of a Trap and Truck Facility at ORCD), FI-6 (Water Quality Effects on Fish), FI-7 (Fish Ladder Closure), FI-11 (Fish Screen Installation), F-14 (Notching Old Carmel River Dam) and FI-15 (Sleepy Hollow Steelhead Rearing Facility), would be the same as the Proponent's Proposed Project. Impacts and mitigation for Issues FI-1 (Access Route Improvements) and Impact FI-10 (Relocate CAW Water Diversion Upstream) would be the same as Alternative 1 except that it would relocate the diversion upstream 2,900 feet. Impact Issues FI-2 (Dewatering River Channels for Construction Purposes) and FI-8 (Upstream Fish Passage), would be the same as Alternative 2 except FI-2 would occur during CY 4. Impact Issues FI-9b (Impacts to Fish from Excavation or Dredging of Sediment for Fish Passage) and FI-12 (Downstream fish passage over SCD) would not apply to this alternative.

Issue FI-4: Diversion of Carmel River and San Clemente Creek around San Clemente Reservoir for Construction Purposes

Short-term loss of aquatic habitat
Determination: ***significant, unavoidable, short-term***

IMPACT

Impacts would be similar to those described for Alternative 2 Issue FI-4 except the Carmel River would be diverted out of its channel for about 3,300 feet upstream of the Dam and about 1,350 feet for San Clemente Creek. Both stream channels would be out of production for two years. This would be a significant, unavoidable impact because of the loss of seasonal rearing habitat.

Loss of habitat would affect an unknown number of juvenile steelhead rearing in the reservoir. This loss of habitat would occur for three construction seasons and would be a significant impact.

MITIGATION

Mitigation for Issue FI-4 would be the same as Alternative 2 except it would occur for about 3,300 feet in the Carmel River for 1,350 feet of San Clemente Creek and would occur for two years during the construction season.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead for two construction year cannot be fully mitigated and would be significant.

Issue FI-5: Reservoir Dewatering

Short-term loss of aquatic habitat
*Determination: **significant, unavoidable, short-term***

IMPACT

Reservoir dewatering in CY 4 and 5 would be similar to the Proponent's Proposed Project Issue FI-5, except that the sediments would be dewatered to near the original elevation of the river bed of the river to allow for complete sediment removal in the San Clemente Creek arm of the reservoir and in the Carmel River immediately upstream of the Dam. Dewatering would occur for two construction seasons. This would be a significant, short-term impact.

MITIGATION

Mitigation measures would be the same as for the Proponent's Proposed Project Mitigation Measure FI-5, except they would occur for three construction years. Operating traps at the inflowing channels to the reservoir would mitigate downstream passage.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead for three construction years cannot be fully mitigated and would be significant.

Issue FI-9a: Sediment Impacts to Downstream Channels from Sluicing, Dredging or Sediment Transport Downstream

Long-term loss of aquatic habitat
*Determination: short-term **less than significant; beneficial, long-term***

IMPACT

Alternative 3 would remove the Dam and the sediment in the San Clemente Arm of the reservoir. Fish in the river downstream of the Dam would be exposed to some sedimentation during the winter following CY 4 and 5. Most potential sediment impacts would occur after storm flows following dam removal. Sediment transport rates would be restored to about 75 percent of the pre-dam levels in the river downstream of the dam site. At the end of the 41-year simulation, deposited sediment would increase bed elevation, sediment volume and gravel volume in all subeaches except subreaches 6.3, 8.3, and 8.7. This would improve habitat for fish and aquatic invertebrates throughout the Carmel River from the Dam downstream through Subreach 5, 7.3, and 7.7.

There would be some fine sediment released from the exposed former inundation area in the San Clemente arm of the reservoir. Suspended sediment modeling indicated this alternative would not change the effects levels from Sublethal in subeaches downstream of SCD. This would be a less than significant impact.

Compared to the existing conditions with a Sublethel Effects Level for suspended sediment concentrations in all subreaches, Alternative 3 would result in the same Sublethal Effects Levels for all subreaches downstream of SCD. Compared to the 2030 Baseline, Alternative 3 would result in the same Sublethtal Effects Levels in subreaches downstream of SCD.

Fishery Reaches 6 and 7 support about 33,943 juvenile steelhead representing about 43 percent of the total juvenile steelhead and about 26 percent of the rearing habitat in the river downstream of LPD. This would be a less than significant impact in the short-term and beneficial in the long-term. No mitigation is required.

Issue FI-13: Stream Sediment Removal, Storage, and Associated Restoration

Long-term reduction of aquatic habitat, short-term alteration of aquatic habitat
Determination: ***significant, unavoidable in the short-term; beneficial in the long-term***

IMPACT

Rock material from the diversion channel cut through the ridge separating the Carmel River from San Clemente Creek would be used to construct a cutoff wall across the Carmel River arm upstream of the diversion channel. Excess rock and concrete blocks from dam removal would be used to buttress the toe of the sediment storage area on the Carmel River arm. The Carmel River and San Clemente Creek would not support conditions for rearing steelhead during CY 4.

Accumulated sediment would be excavated from about 800 feet of the existing San Clemente Creek channel. About 3,600 feet of the present Carmel River channel upstream of the Dam would be permanently lost to sediment storage.

About 2,200 feet of San Clemente Creek would become the Carmel River including about 850 feet of channel now under the reservoir in the San Clemente arm. The Carmel River would change from about 3,000 feet to 2,650 feet, a reduction of about 350 feet. San Clemente Creek would lose 1,350 feet of channel from the reservoir upstream to the confluence with the realigned Carmel River channel. There would be a net loss of about 1,700 feet of channel (Table 4.4-11) – a combination of shortening the Carmel River and moving the confluence of the Carmel River and San Clemente Creek upstream about 2,200 feet. There would be temporary loss of habitat for steelhead and other aquatic species in the reservoir and both channels during construction. There would be a permanent loss of about 1,700 feet of channel length under this alternative (Table 4.4-11). This would be a long-term significant impact.

MITIGATION

A new channel for the Carmel River would be constructed through the diversion bypass channel between the Carmel River and San Clemente Creek, and down the San Clemente Creek arm. The new configuration would include about 300 feet of constructed channel through the bypass, and about 2,200 feet of newly constructed channel in the existing San Clemente Creek arm. Channel restoration activities would include excavation and placement of gravel, cobble, and boulder materials salvaged during sediment removal. Construction of the new Carmel River channel would be geomorphically designed based upon flow capacity requirements, gradient, and valley width of the Carmel River. Habitat in restored channels would be re-vegetated with native trees and shrubs.

The Dam would be removed, restoring unimpaired fish access past the SCD site to the upper watershed and substantially restoring sediment transport to the lower river. The loss of 1,700 feet of channel would significant, but the long-term improvement to habitat conditions in the restored channels and removal of the Dam as a fish barrier would be a benefit. Even though there is a long-term benefit, there are significant short-term impacts that cannot be mitigated.

4.4.3.3 Alternative 4 (No Project)

Aquatic and fisheries impacts and mitigation for Issues FI-1 (Access Route Improvements), FI-2 (Dewatering River Channels for Construction Purposes), FI-3 (Operation of a Trap and Truck Facility at the ORCD), FI-4 (Diversion of Carmel River and San Clemente Creek Around San Clemente Dam for Construction Purposes), FI-6 (Water Quality Effects on Fish), FI-7 (Fish Ladder Closure), FI-9a (Sediment Impacts to Downstream channels from Sluicing, Dredging or Sediment Transport Downstream), FI-9b (Impacts to Fish from Excavation or Dredging of Sediment for Fish Passage), FI-10 (Relocate CAW Water Diversion Upstream), FI-11 (Fish Screen Installation), FI-13 (Stream Sediment Removal, Storage and Associated Restoration) FI-14 (Notching Old Carmel River Dam) and FI-15 (Sleepy Hollow Steelhead Rearing Facility) would not apply to this alternative.

Issue FI-5: Reservoir Dewatering

Long-term loss of aquatic habitat
*Determination: **significant, unavoidable, long-term***

IMPACT

The Interim Seismic Safety Measures Annual Reservoir Drawdown required by DSOD would continue as an interim method to provide dam safety. Drawdown would occur on May 31 each year when flows are at or below 30 cfs at the Sleepy Hollow gage. The Annual Drawdown would continue to occur until the reservoir is filled with sediment or when there is less than 50 acre feet of storage remaining in the reservoir.

While it is difficult to determine whether the loss of fish that are not rescued or that are injured or die during the rescue and relocation operations is significant, the losses along with the short-term loss of habitat for steelhead each season cannot be fully mitigated and would be significant. This would be a significant long-term impact.

MITIGATION

No mitigation would be provided under the No Project Alternative. The Annual Drawdown is covered under a NMFS Biological Opinion and the CDFG Streambed Alteration Agreement both address operations from 2007 through 2012.

Issue FI-8: Upstream Fish Passage

Long-term impact to fish migrating to upstream spawning and rearing habitat
*Determination: **significant, unavoidable, long-term***

IMPACT

The existing ladder would remain in place and continue to provide impaired upstream passage to adult steelhead. No ladder improvements would occur and the SOMP would not be implemented. This would be a significant long-term impact.

MITIGATION

No mitigation would be provided under the No Project Alternative.

Issue FI-12: Downstream Fish Passage over SCD

Long-term impacts to adult fish passing over San Clemente Dam
*Determination: **significant, unavoidable**, **long-term***

IMPACT

The No Project Alternative would retain the Dam with no improvements and the SOMP would not be implemented. Adult fish would continue to be exposed to injury or death as they pass over the spillway and fall the 65 feet into the plunge pool. This would be a significant long-term impact.

MITIGATION

No mitigation would be provided under the No Project Alternative.

Issue FI-15: Sleepy Hollow Steelhead Rearing Facility

Loss or degradation of water supply
*Determination: **significant, unavoidable, long-term***

IMPACT

The SHSRF depends on Carmel River water from SCD to operate from early summer to winter or early spring. The No Project would result in the reservoir filling with sediment, blocking the intake for water and degrading reservoir and downstream water quality. This would be a significant long-term impact.

MITIGATION

No mitigation would be provided under the No Project Alternative.

4.5 VEGETATION AND WILDLIFE

This section describes the potential impacts of the San Clemente Seismic Safety Project on the terrestrial biological resources of the Project Area. Vegetation and wildlife resources include all vegetation and wildlife influenced by the project, except for fisheries, which is covered in Section 4.4. Wetlands are covered in Section 4.6. Additional information provided in this Final EIR/EIS) clarifies and amplifies the information included in the Draft EIR/EIS. The following environmental setting section was prepared using information developed from the documents provided by the RDEIR (Denise Duffy & Associates 2000), which was initiated in 1997. Additional data were acquired during studies in 2005 for alternatives not considered in the RDEIR, or for modifications to previously considered alternatives. Appendix T contains the botanical report for the sediment disposal options. Appendices U and V contain the Botanical Resources Management Plan and Protection Measures for Special-Status Species.

4.5.1 ENVIRONMENTAL SETTING

Vegetation Communities

Based on literature review and field surveys, fifteen plant communities (habitat types) dominated primarily by native species were identified in the Project Vicinity. Six of these communities are riparian, four communities are upland forest or woodland types, and three communities are upland shrub-dominated types. The remaining two native plant communities are herbaceous. A number of sites within the Project Vicinity were mapped as intermediate between two recognized community types. Generally, these communities correspond to Sawyer and Keeler-Wolf's vegetation series (Sawyer & Keeler-Wolf 1995). Mixed stands may be described by Holland's vegetation classifications (Holland 1986), and these classifications have also been provided where they correlate with the series categories.

In addition to the native plant communities, sites that are classified as developed or disturbed/ruderal occur in the Project Area. On these sites, human activity controls the vegetation present.

Brief descriptions of the vegetation types occurring within the Project Area are presented below. The distributions of the habitat types within the Project Area are shown in Figure 4.5-1. A list of vascular plant species observed in the Project Area is presented in Appendix T.

Riparian Vegetation

CENTRAL COAST COTTONWOOD-SYCAMORE RIPARIAN FOREST

This community is the predominant riparian type on the flood plains of the Carmel River and Tularcitos Creek. The dominant species are large trees, including black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), California sycamore (*Platanus racemosa*), red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), and white alder (*Alnus rhombifolia*).

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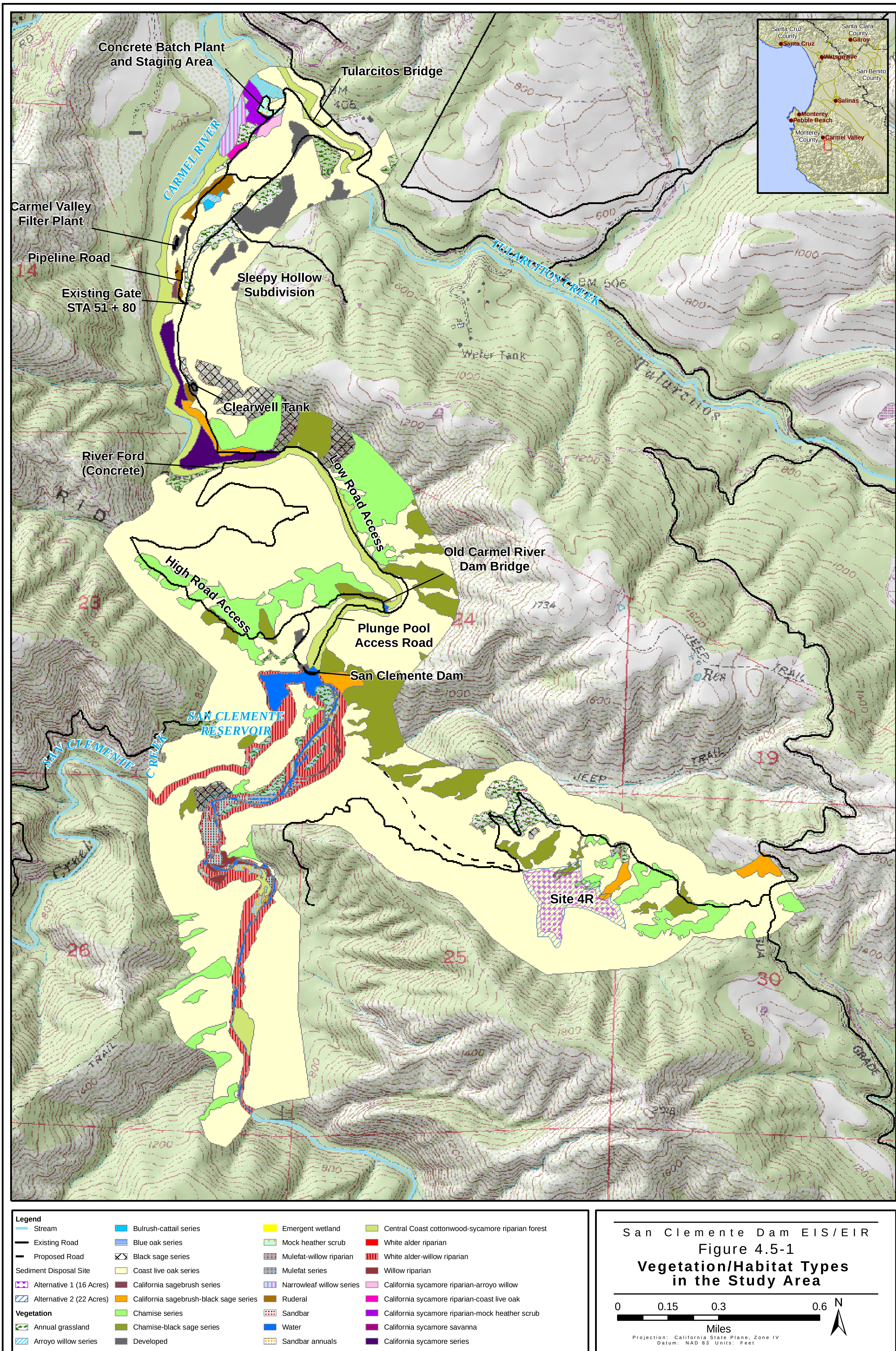

San Clemente Dam EIS/EIR

Figure 4.5-1

Vegetation/Habitat Types in the Study Area

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Coast live oak (*Quercus agrifolia*), California buckeye (*Aesculus californica*), and California bay (*Umbellularia californica*) are also found in this riparian forest. Characteristic shrub species in areas of infrequent flooding include common snowberry (*Symphoricarpos albus* var. *laevigatus*), poison-oak (*Toxicodendron diversilobium*), and red-osier dogwood (*Cornus sericea*). Vines such as Pacific blackberry (*Rubus ursinus*) and virgin's bower (*Clematis ligusticifolia*) also may be abundant locally. The herb layer is generally sparse, but herb species such as slough sedge (*Carex barbarae*), stinging nettle (*Urtica dioica* ssp. *holosericea*), and Douglas' mugwort (*Artemisia douglasiana*) occur locally in the understory.

WHITE ALDER RIPARIAN FOREST

In areas within and adjacent to the Carmel River and San Clemente Creek channels that are subject to more frequent or more intense flooding, the tree canopy is sparser and less developed. Trees, primarily white alder and red willow, are interspersed with large shrubs such as narrow-leaved willow (*Salix exigua*), mule fat (*Baccharis salicifolia*), shrubby arroyo willow, and redosier dogwood (*Cornus sericea*). Shrubs and small trees may form dense thickets. A wide variety of herb species occurs in the more open areas. Stands of this community that occupy the edge of the previous high-water line of the reservoir around the reservoir pool have died since the maximum elevation of the reservoir has been lowered by the permanent removal of the flashboards.

ARROYO WILLOW SERIES (CENTRAL COAST ARROYO WILLOW RIPARIAN FOREST)

This community is dominated by the shrub arroyo willow, with red willow an associated species. The arroyo willow series occurs in two places in the northern portion of the Project Vicinity. The canopy of the arroyo willow forest is typically dense, with few understory plants. In the Project Vicinity, a few other shrubs such as coyote brush (*Baccharis pilularis*), poison-oak and vines such as Pacific blackberry may be present. The relatively sparse herbaceous understory includes Douglas' mugwort, California bee-plant (*Scrophularia californica*), and stinging nettle. The relatively large stand of the arroyo willow series near the northern end of the Project Vicinity consists of a dense willow canopy interspersed with open areas dominated by a dense, often impenetrable, cover of coyote brush.

CALIFORNIA SYCAMORE SERIES (SYCAMORE ALLUVIAL WOODLAND)

Only one stand of this community occurs in the Project Vicinity. It is located on the Carmel River floodplain, just south of the mouth of Tularcitos Creek. This community is savanna-like riparian woodland with widely spaced trees and a relatively dense, grass-dominated herbaceous understory. California sycamore is the dominant tree, with valley oak (*Quercus lobata*) and coast live oak as associated species. Many of the trees are quite large. The vegetation in understory and open areas between the trees is dominated by grasses and herbs, including ripgut brome (*Bromus diandrus*), long-beaked filaree (*Erodium botrys*) and valley lessingia (*Lessingia glandulifera* var. *pectinata*).

NARROWLEAF WILLOW SERIES (CENTRAL COAST RIPARIAN SCRUB)

This community occurs in one segment of the Carmel River channel, south of the mouth of Tularcitos Creek. This series is dominated by large shrubs, particularly narrow-leaved willow. Associated shrub species include shrubby arroyo willow, mule fat, poison-oak, and Spanish broom (*Spartium junceum*). Saplings and small trees of California sycamore, black cottonwood, and white alder are also frequent, but large trees are few and widely scattered. In areas where shrub cover is sparse or absent, a wide variety of herb species occur, including common horsetail (*Equisetum arvense*), horseweed (*Conyza canadensis*), western goldenrod (*Euthamia occidentalis*), Mexican tea (*Chenopodium ambrosioides*), and Durango root (*Datisca glomerata*).

MULEFAT SERIES (MULEFAT SCRUB)

This community occurs in scattered patches in the Carmel River floodplain, upstream of the Dam. It is found on the sandbars, and intergrades with the willow-dominated series. This series is dominated by mulefat (*Baccharis salicifolius = B. vimenea*). Herbaceous understory is sparse to non-existent. Associated species include young plants of arroyo willow, sandbar willow, and occasionally, white alder.

Upland Forest and Woodland Vegetation

COAST LIVE OAK SERIES (COAST LIVE OAK FOREST)

In the Project Vicinity, this community is the most widespread type on relatively moist slopes with moderately deep soils, particularly on slopes west of the Carmel River. The tree canopy is typically dense, generally exceeding 80 percent (Ecosystems West 1997). Coast live oak is the dominant tree species. Associated tree species in more diverse stands include California bay, California buckeye, madrone (*Arbutus menziesii*), and valley oak. Due to the dense canopy, the understory shrub layer of the coast live oak forest is typically poorly developed. Shrubs and woody vines frequently occurring locally in the understory include creeping snowberry (*Symphoricarpos mollis*), poison-oak, and Pacific blackberry. Herb cover also is generally sparse to moderate, but includes wood fern (*Dryopteris arguta*), yerba buena (*Satureja douglasii*), and western rye grass (*Elymus glaucus*).

CALIFORNIA BAY SERIES (CALIFORNIA BAY FOREST)

One small stand of this community occurs in the Project Vicinity, located on the lowermost slope on the west side of the reservoir's main arm. This is a dense, closed-canopy forest habitat. California bay is the dominant tree species, with madrone a common associate.

BLUE OAK SERIES (BLUE OAK WOODLAND)

In the Project Vicinity, there is one small stand of this community on the north side of Osborne Ridge north of San Clemente Reservoir, along the existing "high road." This community forms an open, savanna-like tree canopy dominated by blue oak (*Quercus douglasii*). In the Osborne Ridge stand, coast live oak is associated with blue oak, with tree cover around 50 percent (Ecosystems West 1997). Few shrubs occur in this stand. The grass and herb layer is well-developed and relatively dense. Dominant or characteristic grasses and herbs include ripgut brome, soft chess (*Bromus hordeaceus*), western rye grass, tarplant (*Madia* sp.), and shooting star (*Dodecatheon* sp.).

REDWOOD SERIES (UPLAND REDWOOD FOREST)

A very small stand of coast redwood (*Sequoia sempervirens*) is located just below the SCD on the west side, along the canyon bottom. The understory of this stand mostly consists of poison-oak. This small stand, the only occurrence of coast redwood in the Project Area, is at the inland limit for coast redwood in the project region.

Upland Shrub Vegetation

COASTAL SCRUB (CENTRAL LUCIAN COASTAL SCRUB)

In the Project Vicinity, coastal scrub is widespread on the slopes bordering the Carmel River canyon, and is most widespread east of the Carmel River in the southern portion of the area. Coastal scrub typically occupies slopes that are drier than those occupied by coast live oak forest, although not as dry as those occupied by chaparral. The coastal scrub in this area is characterized by a dense and often impenetrable shrub layer. Coastal scrub is typically variable in its dominant shrubs, but two species, California sagebrush (*Artemisia californica*) and black sage (*Salvia mellifera*), are the most widespread dominant shrubs in this community in the Project Vicinity. The herb layer is poorly developed or absent except where more open patches exist. Grass and herb species associated with this habitat type include small-flowered needlegrass (*Nassella lepida*), California cudweed (*Gnaphalium californicum*), prickly cryptantha (*Cryptantha muricata* var. *jonesii*), and the vine pipestem clematis (*Clematis lasiantha*). Three intergrading subtypes of coastal scrub occur in this area, and are described below.

California Sagebrush Series. California sagebrush is the dominant shrub in this series. Associated shrub species include coyote brush, black sage, sticky monkeyflower (*Mimulus aurantiacus*), poison-oak, chamise (*Adenostoma fasciculatum*), California buckwheat (*Eriogonum fasciculatum*), and deerweed (*Lotus scoparius*). In the Project Vicinity, the California sagebrush series is found on dry, rocky, east- and south-facing slopes. It is sometimes associated with road cuts or similar disturbances. In this area, it is more limited in extent than black sage-dominated coastal scrub and typically occurs on lower, more sheltered slopes (Ecosystems West 1997).

Black Sage Series. Stands of the black sage series are usually overwhelmingly dominated by black sage. Associated species include California sagebrush, coyote brush, sticky monkeyflower, poison oak, chamise, and California buckwheat. Small and medium-sized coast live oaks are frequent in this community in the Project Vicinity. The herb layer in this phase of coastal scrub is typically even sparser and less diverse than in the California sagebrush series. In the Project Vicinity, this series tends to occur on more exposed east- and south-facing slopes (Ecosystems West 1997).

California Sagebrush-Black Sage Series. The California sagebrush-black sage series is intermediate between the California sagebrush and black sage series. California sagebrush and black sage are equally dominant in this series. Other shrub species include coyote brush, sticky monkeyflower, poison-oak, California buckwheat, chamise, and deerweed. The shrub composition of this subtype tends to be more diverse than in either of the other two subtypes of coastal scrub. The herb layer, where present, is similar to that in the California sagebrush series. In the Project Vicinity, this series occurs on lower west- and south-facing slopes (Ecosystems West 1997).

CHAPARRAL (CHAMISE CHAPARRAL)

This community occurs on the driest, most exposed slopes in the Project Area, typically forming a dense, often impenetrable scrub that is three to ten feet in height. Herbs are generally sparse or absent except in localized openings. Two intergrading subtypes of chaparral occur in the Project Area, and are described below.

Chamise Series. Chamise is the major dominant species in this subtype, and often forms pure stands. Other shrub species sometimes found in this series include black sage, jimbrush (*Ceanothus oliganthus* var. *sorediatus*), California buckwheat, and poison oak. Chamise chaparral is widespread on exposed south- and west-facing slopes in the southern half of the Project Vicinity (Ecosystems West 1997).

Chamise-black sage series. This series is intermediate between the chamise series and the black sage subtype of the coastal scrub communities. Black sage and chamise share dominance in this series. Other shrub species commonly found in this community include California buckwheat, jimbrush, and California sagebrush. In the Project Vicinity, the chamise-black sage series is commonly found on south-facing slopes in the southern half of the Project Vicinity. This series is frequently found growing adjacent to road cuts and similar disturbances (Ecosystems West 1997).

MOCK-HEATHER SCRUB

This scrub type is developed locally on the floodplain of the Carmel River just south of the mouth of Tularcitos Creek in the northern portion of the Project Vicinity. In the area occupied by mock-heather shrub, the alluvial substrate consists primarily of fine sand. The mock-heather scrub is a moderately dense scrub type dominated by mock-heather (*Ericameria ericoides*), a species that is restricted to sandy soils. Coyote brush is the most common shrub associate. Small amounts of poison-oak and scattered small coast live oaks also occur in this habitat type. The herb layer is sparse, but includes Douglas's mugwort and creeping wildrye (*Leymus triticoides*). Rattail fescue (*Vulpia myuros*) is locally abundant (Ecosystems West 1997).

Herbaceous Vegetation

CALIFORNIA ANNUAL GRASSLAND SERIES (NON-NATIVE GRASSLAND)

Annual grassland communities occur on a number of localized sites throughout the Project Vicinity, including the Carmel River floodplain as well as in the uplands. These grasslands are generally dominated by non-native annual grasses and native and non-native herbs, including ripgut brome, soft chess, slender wild oat (*Avena barbata*), long-beaked filaree, and valley lessingia. Some stands of this community have been subject to obvious disturbances such as brush clearing and grading, and intergrade with the disturbed/ruderal habitat type in the Project Vicinity.

BULRUSH-CATTAIL SERIES (COASTAL AND VALLEY FRESHWATER MARSH)

There are two retention ponds in the Project Vicinity north of the existing water treatment facility. These retention ponds are seasonally flooded. During the period in which the surveys were conducted for the 2000 RDEIR, one of the retention ponds was flooded and created a freshwater marsh or pond habitat referable to the bulrush-cattail series. Viscid bulrush (*Scirpus acutus* var. *occidentalis*) and broad-leaved cattail (*Typha latifolia*) dominated this artificially created marsh habitat (Ecosystems West 1997).

DEVELOPED/DISTURBED/RUDERAL HABITAT TYPES

These habitat types encompass a variety of sites with vegetation that is primarily the result of human activity and disturbance, and include sites that are occupied by buildings and other developed facilities and associated landscaped areas. They also include sites that have been subject to relatively recent, often repeated, heavy disturbance such as grading, excavating, or brush clearing. The species of vegetation in these habitats vary greatly, depending on micro-habitat conditions and disturbance and planting history. These sites are typically dominated by an assortment of weedy, mostly non-native annual and perennial grasses and herbs, unless they are occupied by developed facilities or landscaping. Some native species can also persist in or colonize ruderal sites. Any of these sites may have considerable bare ground.

Vegetation Communities Traversed by Access Routes

The access routes traverse a series of vegetation communities, as described below:

THE TULARCITOS ACCESS ROUTE

The Tularcitos Access Route for the Proponent’s Proposed Project begins at the Carmel Valley Road and joins the dam access road. It begins in coast live oak woodland and passes through Central Coast cottonwood-sycamore riparian forest, coast live oak woodland, arroyo willow series, mock heather scrub, California sycamore riparian-mock heather scrub, annual grassland, coast live oak woodland, California sycamore riparian-coast live oak, annual grassland, coast live oak woodland, ruderal vegetation, coast live oak woodland, ruderal habitat, coast live oak woodland, and annual grassland.

THE CACHAGUA ACCESS ROUTE

The Cachagua Access Route (Alternatives 1, 2, and 3) consists of the Jeep Trail from Cachagua Road to the sediment disposal site. It begins in coast live oak woodland, and passes through chamise series, chamise-black sage series, coast live oak woodland, chamise series, coast live oak woodland, annual grassland, coast live oak woodland, annual grassland, chamise-black sage series, and ends in coast live oak woodland.

The conveyor route, which is part of the access route for Alternatives 1, 2, and 3, begins at the Jeep Trail at Site 4R and ends at the reservoir. Although it passes primarily through coast live oak woodland, two short sections intercept or partly intercept chamise-black sage series. This route ultimately ends in white alder-willow riparian vegetation at the reservoir, but this last is considered part of the construction area, not part of the access route.

SAN CLEMENTE DRIVE

San Clemente Drive begins at the Carmel Valley Road and continues through the Sleepy Hollow community up to the intersection with the Tularcitos Access Route. The road through Sleepy Hollow begins in coast live oak woodland, passes through Central Coast cottonwood-sycamore riparian forest and back into coast live oak woodland, then through annual grassland, coast live oak woodland, annual grassland, coast live oak woodland, annual grassland, coast live oak woodland, annual grassland, and meets the Tularcitos route in coast live oak woodland/annual grassland. The Proponent's Proposed Project would only use this section until the Tularcitos Access Route is completed. The other action alternatives would use it for access to the base of the Dam.

San Clemente Drive and its various subsidiary roads extend from the Tularcitos road junction to the Dam and back for all project alternatives. The main road passes through coast live oak woodland, ruderal and developed habitat, coast live oak woodland, chamise-black sage series, chamise series, chamise-black sage series, partially intercepts an area of California sycamore series, passes through more chamise-black sage series and a more extensive area of California sycamore series, between chamise-black sage series and Central Coast cottonwood-sycamore riparian forest, then through coast live oak woodland, Central Coast cottonwood-sycamore riparian forest, chamise-black sage series, coast live oak woodland. At the OCRD, the eastern access route extends southwest through Central Coast cottonwood-sycamore riparian forest to the foot of the Dam. The western access route crosses the Carmel River via the bridge and passes through chamise-black sage series, chamise series, and coast live oak woodland, and several small developed areas associated with the Dam facilities. Another unnamed road extends over the hill from the dam facility back to the main access road, crossing the Carmel River at the ford. This road begins in coast live oak woodland near the Dam and passes through chamise-black sage series, coast live oak woodland, chamise series, a combination of chamise-black sage series and coast live oak woodland, coast live oak woodland, chamise series, a long stretch of coast live oak woodland, an area with blue oak series, another long stretch of coast live oak woodland, annual grassland, more coast live oak woodland, Central Coast cottonwood-sycamore riparian forest, and joins the main road in California sycamore series vegetation.

Wildlife

Valley and Foothill Riparian (Central Coast cottonwood-sycamore riparian forest, white alder riparian forest, arroyo willow series, California sycamore series, narrowleaf willow series, mulefat series): Valley-foothill riparian habitats provide food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. At least 50 amphibians and reptiles occur in lowland riparian systems. Many are permanent residents; others are transient or temporal visitors. Typical species include western pond turtle (*Emys* [*Clemmys] marmorata*), garter snakes, swallows, vireos, flycatchers, bats, and raccoon (*Procyon lotor*).

Montane Hardwood (California Bay series): Bird and animal species characteristic of the Montane Hardwood habitat include scrub jay (*Aphelocoma californica*), Steller's jay (*Cyanocitta stelleri*), acorn woodpecker (*Melanerpes formicivorus*), western gray squirrel (*Sciurus griseus*), wild turkey (*Meleagris gallopavo*), mountain quail (*Oreortyx pictus*), band-tailed pigeon (*Columba fasciata*), California ground squirrel (*Spermophilus beecheyi*), dusky-footed woodrat (*Neotoma fuscipes*), black bear (*Ursus americanus*), and mule deer (*Odocoileus hemionus*) (Mayer & Laudenslayer 1988). Deer also use the foliage of several hardwoods to a moderate extent. Many amphibians and reptiles are found on the forest floor in this habitat. Among them are ensatina (*Ensatina eschscholtzii*) and western fence lizard (*Sceloporus occidentalis*), rubber boa (*Charina bottae*), western rattlesnake (*Crotalus viridis*), California mountain kingsnake (*Lampropeltis zonata*), and sharp tailed snake (*Contia tenuis*).

Blue oak woodland (blue oak series): This plant community provides breeding habitats for a large variety of species. For example, in the western Sierra Nevada, 29 species of amphibians and reptiles, 79 species of birds, and 22 species of mammals utilize this habitat for breeding (Mayer & Laudenslayer 1988). Wildlife species characteristic of oak habitats include western fence lizard, western rattlesnake, western scrub jay, acorn woodpecker, Botta’s pocket gopher (*Thomomys bottae*), and California ground squirrel.

Coastal Oak Woodland (coast live oak series): Coastal oak woodlands provide habitat for a variety of wildlife species. At least 60 species of mammals are reported to use oaks in some way. As many as 110 species of birds have been observed during the breeding season in California habitats where oaks form an important part of the canopy or subcanopy. Quail, turkeys, squirrels, and deer may be so dependent on acorns in fall and early winter that a poor acorn year can result in substantial declines in their populations (Mayer & Laudenslayer 1988). Species commonly found in this habitat are similar to those in blue oak woodland.

Coastal Scrub (California sagebrush series, black sage series, California sagebrush-black sage series, mock-heather scrub): Though vegetation productivity is lower in Coastal Scrub than in adjacent chaparral habitats associated with it, Coastal Scrub appears to support numbers of vertebrate species roughly equivalent to those in surrounding habitats (Mayer & Laudenslayer 1988). Species typical of this habitat are similar to those described below for chamise-redshank chaparral.

Chamise-Redshank Chaparral (chamise series, chamise-black sage series): A wide variety of wildlife use chaparral habitat. Wildlife that commonly may be found in this habitat type includes common kingsnake (*Lampropeltis getula*), California quail (*Callipepla californica*), Bewick's wren (*Thryomanes bewickii*), Anna's hummingbird (*Calypte anna*), greater roadrunner (*Geococcyx californianus*), black-tailed jackrabbit (*Lepus californicus*), and coyote (*Canis latrans*).

Annual grassland (California annual grassland series): Common wildlife species typical of this habitat include western fence lizard, western rattlesnake, turkey vulture (*Cathartes aura*), American kestrel (*Falco sparverius*), California ground squirrel, Botta's pocket gopher, western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), black-tailed jackrabbit, and coyote.

Fresh emergent wetlands (bulrush-cattail series): These habitats are among the most productive wildlife habitats in California and are important to wildlife for water and food. Common wildlife species in this habitat include Pacific chorus frog (*Pseudacris regilla*), western aquatic garter snake (*Thamnophis couchii*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), red-winged blackbird (*Agelaius phoeniceus*), ornate shrew (*Sorex ornatus*), deer mouse, and muskrat (*Ondatra zibethicus*).

Riverine habitat in the Project Area is found along the Carmel River and its tributaries. Riverine habitat can provide resting and escape cover for waterfowl. Several gulls and terns forage in open water. Near-shore waters provide food for waterfowl, herons, shorebirds, and belted kingfisher (*Ceryle alcyon*). Many species of insectivores (e.g., swallows, swifts, and flycatchers) forage over the water.

Lacustrine habitat in the Project Area is supplied by the reservoir. This habitat is used by 18 mammal, 101 bird, nine reptile, and 22 amphibian species. Open water habitat provides resting and foraging habitat for several waterbirds, including the American coot (*Fulica americana*), common merganser (*Mergus merganser*), and great blue heron. Other characteristic species found in open water habitats include the eared grebe (*Podiceps nigricollis*), pied-billed grebe (*Podilymbus podiceps*), common goldeneye (*Bucephala clangula*), cliff swallow (*Petrochelidon pyrrhonota*), tree-swallow

(*Tachycineta bicolor*), and several bat species (Mayer and Laudenslayer 1988). Open water also provides a water source for many common mammal species.

In addition, several species of wildlife have adapted to developed habitat. These include rock dove (*Columba livia*), western scrub jay, northern mockingbird (*Mimus ployglottos*), house finch (*Carpodacus mexicanus*), house sparrow (*Passer domesticus*), opossum (*Didelphis marsupialis*), raccoon, and striped skunk (*Mephitis mephitis*).

Sensitive Habitats

Sensitive habitats include riparian corridors, wetlands, habitats for legally protected species and CDFG species of special concern, areas of high biological diversity, areas providing important wildlife habitat, and unusual or regionally restricted habitat types. Habitat types considered sensitive in this analysis were based on those listed on the California Natural Diversity Database's (CNDDB) working list of "high priority" habitats (i.e., those habitats that are rare or endangered within the borders of California). In September, 2000, critical habitat was proposed in the Federal Register for the California red-legged frog (CRLF). The proposed designation was revised November 3, 2005 and includes 51 habitat units, including Monterey County. A final designation is still under consideration. On September 2, 2005, the final designation of critical habitat for steelhead was listed in the Federal Register. The designation includes Monterey County. Habitat types dominated by oaks (*Quercus* spp.) are also considered sensitive under the provisions of Title 16, Chapter 16.60, Monterey County Code, which provides for preservation of oaks and other protected tree species.

In addition, ten of the fifteen native plant communities occurring in the Project Area are recognized as sensitive habitats. Eight of these communities are recognized as "high priority" habitats by the CNDDB, as follows: the central coast cottonwood-sycamore riparian forest, the arroyo willow series (central coast arroyo willow riparian forest), the California sycamore series (sycamore alluvial woodland), the narrow-leaf willow series (central coast riparian scrub), the white alder riparian forest, the California bay series (California bay forest), mulefat scrub, and the bulrush-cattail series (coastal and valley freshwater marsh). The two remaining sensitive habitats are the coast live oak series (coast live oak forest) and the blue oak series (blue oak woodland), which are considered sensitive habitats under the provisions of Title 16, Chapter 16.60, Monterey County Code. A brief description of these sensitive habitats on the Project Site is provided below. The distribution and extent of the sensitive habitats in the Project Vicinity is shown in Figure 4.5-1.

Riparian Habitats

Riparian habitats are sensitive because they are ecologically specialized habitats of limited distribution, have high value for wildlife, and have declined greatly in California due to large-scale disturbances such as urbanization, stream channelization, and agricultural conversion (Warner and Hendrix 1984).

CENTRAL COAST COTTONWOOD-SYCAMORE RIPARIAN FOREST

This is a CNDDB "high priority" habitat type that is found along the Carmel River in the Project Vicinity (including the narrowleaf willow series, which intergrades with the central coast cottonwood-sycamore riparian forest. This forest is a diverse, well-developed, high-quality, native riparian complex. The hydrology of this riparian habitat is artificially controlled by the upstream dams, but the riparian habitat has experienced little direct human disturbance. It is composed almost entirely of native species, with little invasion of non-natives, except for localized colonies of Spanish broom. The biological diversity of the riparian forest and scrub habitat in the Project Vicinity makes it especially valuable to wildlife by providing a variety of microhabitats.

The riparian forest is more limited in extent along Tularcitos Creek than along the Carmel River. This forest is similar to the cottonwood-sycamore riparian forest along the Carmel River, but is more uniformly a dense closed-canopy forest, reflecting the much lower frequency and intensity of flooding along Tularcitos Creek (Ecosystems West 1997).

ARROYO WILLOW SERIES (CENTRAL COAST ARROYO WILLOW RIPARIAN FOREST)

This is a CNDDB "high priority" habitat type that is of high value for wildlife. This habitat has been greatly reduced in regional extent by the same large-scale disturbances as other riparian types. This habitat type occurs in two locations in the northern portion of the Project Vicinity. It lies within the floodplain of the Carmel River, but is away from the main channel.

CALIFORNIA SYCAMORE SERIES (SYCAMORE ALLUVIAL WOODLAND)

This is a CNDDB "high priority" habitat type. This habitat type is sensitive because it is limited in extent and because it has been reduced by the same large-scale disturbances as other riparian types. The only example of this habitat type in the Project Vicinity is on the east bank of the Carmel River, south of the mouth of Tularcitos Creek.

NARROWLEAF WILLOW SERIES (CENTRAL COAST RIPARIAN SCRUB)

This is a CNDDB "high priority" habitat type. This habitat occurs in and immediately adjacent to the Carmel River channel in the northern portion of the Project Vicinity, forming part of the complex of riparian habitats along the Carmel River. The heterogeneity of the riparian habitats along the river increases their importance as sensitive habitats. Like other riparian habitat types, the narrowleaf willow series is considered a sensitive habitat type because of its high value for wildlife and because it has been reduced by large-scale disturbances to riparian corridors.

COAST LIVE OAK SERIES (COAST LIVE OAK FOREST)

Coast live oak forest is widespread on upland slopes throughout the Project Vicinity. This habitat type is considered sensitive under the provisions of Title 16, Chapter 16.60, Monterey County Code and is subject to Section 21083.4 of the California Public Resources Code (2004), relating to oak woodlands conservation. The CDFG has also been directed by the state legislature under State Senate Concurrent Resolution No. 17 (California Resolution Chapter 100) to conserve oak woodlands where CDFG has direct permit or licensing authority. Oaks are important to wildlife for shelter and food (acorns). In addition, they are of general public interest and high scenic value. Oak forests and woodlands are also considered sensitive due to the considerable recent loss of oak-dominated habitats state-wide and the decline in regeneration of many oak species.

BLUE OAK SERIES (BLUE OAK WOODLAND)

This oak-dominated habitat type is also considered sensitive under the provisions of Title 16, Chapter 16.60, Monterey County Code and is subject to Section 21083.4 of the California Public Resources Code (2004), relating to oak woodlands conservation. Blue oak woodland is a widespread habitat type in the dry interior of Northern and Central California. The Project Vicinity is relatively close to the coast for this habitat type, and only one small stand occurs within the Project Vicinity, on the north side of Osborne Ridge north of SCD.

CALIFORNIA BAY SERIES (CALIFORNIA BAY FOREST)

This is a CNDDB "high priority" habitat type. The only stand of this habitat type in the Project Vicinity occurs on the lower slope adjacent to the eastern shore of San Clemente Reservoir.

BULRUSH-CATTAIL SERIES (COASTAL AND VALLEY FRESHWATER MARSH)

This is a CNDDB "high priority" habitat type. Freshwater marshes are sensitive habitats because they are limited in extent, are highly dependent on specialized ecological conditions, have high value for wildlife, and are easily degraded by disturbances such as alteration of hydrology. The only stand of this habitat type in the Project Vicinity is artificial in origin, occurring in Settling Pond Number 1 northeast of the Filter Plant. It is, however, ecologically similar to a naturally occurring freshwater marsh.

Special-status Species

Special-status species include plant and wildlife species listed by the USFWS as Threatened or Endangered under provisions of the Federal ESA of 1973 United States Code (16 USC 1531 et. seq., as amended) as well as Proposed and Candidate species for listing (USFWS 2007). Critical habitat for federally listed special-status species may also be designated. Special-status species also include wildlife species listed as threatened or endangered by the CDFG under provisions of the 1984 California Endangered Species Act (CESA) (CDFG 2005a, 2005b), and plant species listed as Rare, Threatened, or endangered by CDFG under provisions of CESA and the 1977 Native Plant Protection Act (NPPA) (CDFG 2005a). Wildlife species listed by CDFG as species of special concern (CDFG 2005b) are also special-status species.

Special-status species also include plant species included on List 1A (Plants Presumed Extinct in California), List 1B (plants rare, threatened, or endangered in California and elsewhere), or List 2 (plants rare, threatened, or endangered in California, but more common elsewhere) of the California Native Plant Society (CNPS) Inventory of Rare and Endangered Vascular Plants of California (CNPS 2001). These species are subject to State regulatory authority under CEQA. Plant species included on Lists 3 and 4 of the CNPS Inventory could be also considered special-status species. These species are considered to be of lower sensitivity. They generally do not fall under specific State or federal regulatory authority, and specific mitigation considerations are generally not required for these species.

Special-status Plant Species

The potential special-status plant species that may occur in the Project Vicinity were determined based on a review of literature and special-status species data bases, including previous botanical surveys conducted for the Proponent's Proposed Project elsewhere in the vicinity of the project, and on previous knowledge of the regional flora by the biological consultant's botanists. This list is presented in Appendix T. Surveys for special-status species were conducted in 1997 and 2005, and were scheduled to coincide with the periods during which all potential special-status species would be identifiable.

Only two special-status plant species, virgate eriastrum (*Eriastrum virgatum*) and Lewis's clarkia (*Clarkia lewisii*) were found in the Project Vicinity. One small population of virgate eriastrum (an annual species), consisting of 20 to 30 plants in 1997, was found to occur in the Project Vicinity. This population is located at the eastern edge of the floodplain of the Carmel River in the northern portion of the Project Vicinity (Ecosystems West 1997). The plants were found in an old roadbed consisting of sandy alluvium in an open area separating a central coast cottonwood-sycamore riparian forest from coast live oak forest. This species flowers from May to July and is found in sandy chaparral and coastal dune habitats (CNPS 2001) at elevations below 500 meters (Hickman 1993). Virgate eriastrum is on List 4 of the CNPS Inventory, and does not fall under specific state or federal regulatory authority.

Lewis's clarkia was found along the Jeep Trail that is a proposed access route for Alternatives 1, 2, and 3, as well as the proposed sediment disposal site for Alternatives 1 and 2, and the diversion dike area for Alternative 3. This species is also a CNPS List 4 taxon. Lewis's clarkia is an annual species that typically flowers from May to July (CNPS 2001). This plant is usually found in chaparral, cismontane woodland, or coastal scrub communities at elevations below 300 meters (Hickman 1993).

Special-status Wildlife Species

Special-status wildlife species documented as occurring in the study area include: the federally listed CRLF, western pond turtle, foothill yellow-legged frog, two striped garter snake, Monterey dusky-footed wood rat, Cooper's hawk, osprey, and yellow warbler. A nonbreeding single willow flycatcher was reported in May 1997 in riparian habitat considered suboptimal for the species, but no other federal or state listed threatened or endangered bird species were found in the Project Area.

Potentially suitable habitat for other special-status species also exists in or near the Project Area, including: the federally listed California tiger salamander, Coast Range newt, coast horned lizard, Townsend's big-eared bat, California mastiff bat, pallid bat, double-crested cormorant, sharp-shinned hawk, bald eagle, golden eagle, and yellow-breasted chat. No Smith's blue butterflies, suitable habitat or preferred host plants were detected during the surveys. Each special-status wildlife species known or with potential to occur in the study area is discussed below, including a discussion of the quality of habitat and likelihood of occurrence for those species with potential to occur.

AMPHIBIANS AND REPTILES

California red-legged frog (CRLF) (Rana draytonii).[1] The CRLF is listed as threatened under the Federal Endangered Species Act, and is a California species of special concern (Jennings and Hayes 1994; CDFG 2005a). CRLFs spawn in marshes, springs, natural and artificial ponds, slack water pools of rivers and streams (Jennings and Hayes 1994; Hayes and Jennings 1988, Stebbins 2003), and tidally influenced freshwater marshes (Smith and Reis 1996). Typical spawning pool habitat includes moderately deep water (to 1.25 meter in depth), dense bordering and emergent vegetation (e.g., tules, (*Scirpus*), cattails (*Typha*), sedges and rushes (*Carex* and *Juncus*), and willows (*Salix*)), mud or silt substratum, nearly full to full sun exposure, and abundant forage for adults and tadpoles including benthic and suspended algae, benthic macroinvertebrates, and small terrestrial vertebrates such as tree frogs and mice (Jennings and Hayes 1994). CRLF tadpoles are typically found within dense aquatic vegetation, where they are cryptic and also readily find forage (Weins 1970). Hayes and Jennings (1988) noted that tadpoles also forage or hide in muddy substrata. Ranid tadpoles, presumably including CRLF tadpoles, generally consume benthic and suspended algae. CRLFs can use seasonal ponds for spawning, so long as water persists through August (Hayes and Jennings 1988; S. Barry, pers. obs.).

Adult CRLFs may remain nearly all year along the margins of suitable spawning habitat, but during the summer in many regions adult frogs may move from sunlit spawning pools to well-shaded streams with bank undercuts and exposed root masses, so-called "summer habitat" (USFWS 2002). Stream corridors are often considered to be potential "dispersal habitat" for this species (USFWS 2002), but these frogs may use virtually any vegetated non-saline habitat to move among spawning and summer sites (S. Barry, pers. obs.). These frogs typically enter hibernation sites beginning in late October and emerge by mid-January or somewhat later depending on region (USFWS 2002).

[1] Most earlier references use the scientific name *Rana aurora draytonii* for the California red-legged frog, but as of August 2004 this frog is regarded as a full species known as *Rana draytonii* (Shaffer et al. 2004)

CRLFs have declined in the southern part of the state due to habitat loss (Jennings and Hayes 1994). The reasons for declines elsewhere are less clear. The recovery plan for this subspecies (USFWS 2002) states that "Habitat loss and alteration are the primary factors that have affected the CRLF negatively throughout its range." Exotic aquatic predators (bullfrogs, crayfish, and fish), habitat degradation from agricultural and grazing practices, and decreased water quality due to human manipulation of habitats and from water diversion all have been suggested as factors that may explain the decline of this species. However, the effects of these factors are not well documented. Although predation and competition by bullfrogs (*Rana catesbeiana)* is frequently postulated to explain declining CRLF populations, bullfrog control or eradication programs have not always proven effective. Bullfrogs and CRLFs co-occur in seemingly stable relative numbers at many ponds in coastal California (Barry 1999; USFWS 2002). The recovery plan for the CRLF (USFWS 2002, p. 24) states that introduced bullfrogs, crayfish, and species of fish have been a significant factor in the decline of the CRLF. The plan acknowledges that "Changes in habitat that are unfavorable to CRLFs tend to be favorable to a suite of introduced non-native aquatic predators, making it difficult to identify detrimental effects of specific introduced species on CRLFs."

The USFWS has indicated that proliferation of bullfrog populations along the central California coast (e.g. Monterey County) is a substantial threat to the persistence of the CRLF in this area. Insufficient data are available to conclusively determine the extent or mechanism of potential negative impacts of bullfrog populations on coastal CRLF populations in Monterey County or specifically in the Carmel River watershed. However, both species share habitat along the Carmel River and the evidence presented by Hayes and Jennings (1988) suggests that the coexistence is over 100 years old. It is not known whether populations of either species are relatively stable or variable within the watershed under baseline conditions, and monitoring would be needed to determine population trends if habitat conditions change. The current San Clemente drawdown monitoring and rescue program is not designed to identify causal factors responsible for changes in frog populations.

Surveys during the annual drawdowns pursuant to the Interim Seismic Safety Measures for SCD found CRLFs and bullfrogs co-occurring throughout San Clemente Reservoir. Predation has been documented; CRLFs have been found in the stomachs of bullfrogs collected in the Project Area, although other reports indicate that crayfish are a primary food source for bullfrogs. Since 2003, numbers for both species have fluctuated and shifted among locations, possibly as a result of management activities. Bullfrogs consistently outnumber CRLFs at the reservoir pool where specific habitat conditions favor that species. CRLFs are doing well upstream and downstream; and bullfrogs are less numerous than native species downstream.

Upstream of the reservoir pool, USFWS and CAW have collaboratively devised an enhancement program for CRLF. The program involves extensive bullfrog eradication in riparian stream and small pool settings. Enhancement sites have been monitored and improved, and bullfrog eradication has been implemented at these sites.

Implementation of the program since 2003 appears to have benefited CRLF recruitment and overall numbers are benefiting markedly (Froke 2004, 2005, 2007). In and around management sites, CRLF numbers have benefited by releases and natural recruitment has taken place; simultaneously bullfrog numbers have been diminished. Furthermore, downstream of the reservoir, from the Dam to Highway 1, CAW is in the seventh year of intensively monitoring and managing for CRLF reproduction; management that includes rescue and relocation of hundreds of tadpoles each summer (i.e., from stranding conditions), and capture and sacrifice of every bullfrog encountered. The monitoring program is designed to detect and ultimately predict environmental stress to natal populations caused by changes to water level and temperature.

Dispersal of individual CRLFs plays an important role in metapopulation dynamics and therefore, the persistence of populations. SCD was built within a steep, confined reach of the river valley. Although dispersal of individual CRLFs in the Project Area has not been rigorously studied, the SCD may pose a barrier to dispersal.

Site Occurrence. CRLFs had been found frequently during previous surveys in suitable riparian habitat within and near the project site. CRLF "rescues" have been carried out annually since 2003 as part of the mitigation program for the annual drawdown for Interim Seismic Safety Measures for SCD. These operations have resulted in the capture and relocation of hundreds of adults, juveniles, and tadpoles from the reservoir headwaters and isolated pools in the sediment beds along both reservoir arms to more secure pools upstream (as well as the culling of hundreds of bullfrogs) (Froke 2005, 2007).

CRLFs also occur upstream and downstream of the project site on the Carmel River. Numerous observations of CRLFs have been made, documenting a wide distribution of the species throughout the Carmel River Basin (these are cited in the 2000 RDEIR by Denise Duffy & Associates as MPWMD, EIR Associates (Dr. David Mullen), Dr. Jeffery Froke, Zander and Associates, and ENTRIX). The plunge pool and spill-influenced downstream channel below SCD is believed to be unsuitable for this species (none were found during the 1997 surveys) but the species is well-documented further downstream in the Carmel Valley (Museum of Vertebrate Zoology 2005).

These surveys and rescues indicate that CRLFs are nearly ubiquitous wherever bordering cover and low gradient slope is contiguous with the waterway within San Clemente Reservoir and the Carmel River arm upstream of the reservoir, at least to the upstream edge of the deposited sediment bed. Surveys by ENTRIX in July 2005 confirmed that pond habitat within the Carmel River arm occurs up to the upstream end of the reservoir sediment bed, but spawning pools outside of the main river channel are absent further upstream within the surveyed reach, which extended upstream of the sediment bed. Systematic annual surveys conducted between 2002 and 2006 have documented CRLF reproduction in side-channel and off-channel pools up to 1.5 miles upstream of San Clemente Reservoir. As the reservoir levels decline during the summer (and during the annual reservoir drawdown), frogs and tadpoles tend to concentrate in some of the isolated pools in the sediment bed, particularly in densely vegetated areas. The sediment bed is clearly the most important habitat feature of the reservoir during that period.

These frogs also occur, but somewhat less widely, in the San Clemente Creek arm of the reservoir and upstream into the creek. During 1997 surveys, three adult red-legged frogs (including at least one male) were observed by EcoSystems West at the upper extreme of the San Clemente Reservoir along the creek. Surveys further upstream along both the San Clemente Creek and Carmel River arms of the reservoir yielded no additional red-legged frog observations in 1997. However, ten CRLFs were observed (nine captured) in San Clemente Creek in 2004 (Froke 2004), and five CRLFs were observed (five captured) in 2005 (Froke 2005). ENTRIX biologists recorded one probable sighting in July 2005 along San Clemente Creek approximately one mile upstream of San Clemente reservoir, and found that much of San Clemente creek upstream of the reservoir is potentially suitable summer habitat. This area is probably suitable spawning habitat only in the slack water reach just upstream of the reservoir. No CRLF tadpoles were observed in San Clemente Creek in 2004 and 2005, but tadpole, juvenile, and adult bullfrogs were observed and removed in 2004, 2005 and 2006 (Froke 2005 and 2007).

Approximately 1.5 kilometers of the lower portion of Tularcitos Creek was surveyed during 1997, and no CRLFs were observed in this area. In 2000, an adult CRLF was observed in Tularcitos Creek downstream of San Clemente Drive.

Foothill yellow-legged frog (Rana boylii). The foothill yellow-legged frog is a California species of special concern. Low-gradient rocky creeks and streams with dappled shade bordered by mixed chaparral or deciduous and evergreen woodlands constitute the primary habitat for this frog (Zweifel 1955).

Site Occurrence. This species has been documented previously from the Carmel River (California Academy of Sciences 2005) and from San Clemente Creek (Museum of Vertebrate Zoology 2005). No frogs of this species were found during earlier surveys for this project, but an ENTRIX biologist observed one specimen along San Clemente Creek within one mile of SCD in July 2005. The available habitat along this reach of San Clemente Creek is considered marginal for this species, but the stream habitat along this reach may be the best available along San Clemente Creek because of its relatively low gradient relative to upstream reaches. Bullfrogs were abundant along San Clemente Creek during these surveys, but they seemed to favor pool habitat and to avoid the long shallow riffle/runs favored by foothill yellow-legged frogs.

California tiger salamander (Ambystoma californiense). The California tiger salamander (*Ambystoma californiense*) is listed as threatened under the Federal ESA and is a California species of special concern. The California tiger salamander is a terrestrial species that spawns for a few days in water but spends the rest of the year aestivating in subterranean habitat, using the burrows of California ground squirrel

(*Spermophilus beecheyi*) and valley (Botta) pocket gopher (*Thomomys bottae*) (Storer 1925, Stebbins 2003). These salamanders emerge with the first fall rains and move at night to pools when they have impounded enough water to support spawning (Stebbins 1951, Barry and Shaffer 1994). Spawning habitat includes rain pools and ditches and other still water such as stock ponds, small lakes, and (rarely) vernal pools (Barry and Shaffer 1994). After a spawning period that may last as little as a day or two, the adult salamanders leave the spawning pool and return to aestivation habitat. They may re-emerge and revisit spawning pools if late-season rains occur (Stebbins 1951).

Site Specific Occurrence. Although potentially suitable aquatic spawning habitat for the California tiger salamander occurs near the Project Area, this species has not been recorded during field surveys conducted there. California tiger salamanders are well documented from the Carmel Valley, especially the vicinity immediately adjacent to the Hastings Reservation upstream of San Clemente reservoir where life history and demographic variation in the species have been studied since the early 1990's through the year 2000 (Barry and Shaffer 1994, Trenham et al. 2000). Potentially suitable spawning habitat occurs in the Project Vicinity along the Carmel River in the form of two seasonal ponds downstream of the CVFP. No specialized techniques designed to detect California tiger salamanders adults or larvae in terrestrial or aquatic habitat (e.g., seining, drift-fence/live trap) were conducted during 1997 surveys.

Coast Range newt (Taricha torosa torosa). The Coast Range (western or California) newt is a California Species of Concern where it occurs from Monterey County south (CDFG 2005b). This status was originally only from south of the Salinas River in Monterey County (Jennings & Hayes 1994), but has been extended to cover the species throughout Monterey County. Adults are found in terrestrial habitats, but they breed in slow-moving streams, ponds, and reservoirs.

Site Occurrence. Numerous records for the Coast Range newt exist from the Carmel Valley (Museum of Vertebrate Zoology 2005). No Coast Range newts were observed in the Project Area during the surveys, but suitable habitat occurs along the Carmel River and San Clemente Creek.

Western pond turtle (Actinemys [=Clemmys] marmorata). The western pond turtle is a California species of special concern. It occurs in small lakes, ponds, creeks, rivers, and streams across most of the state, except in the Sierra Nevada above about 5000 feet in elevation and in the desert regions. The western pond turtle is most commonly associated with permanent or nearly permanent water within a wide variety of habitat types. Areas of dense turtle populations are typically associated with logs or large rocks used for basking. Pond turtles also require terrestrial habitats for egg laying sites and winter hibernation (Holland 1994).

Site Occurrence. In conjunction with CRLF surveys, observations of pond turtles were recorded and mapped. Western pond turtles were frequently observed along the Carmel River downstream from SCD. Observations of pond turtles were made 11 times with at least six individuals present. Employees of CAW and MPWMD observed groups of 10 or more western pond turtles on the river (Denise Duffy & Associates 2000*).* Many basking sites exist along the river and reservoir, and potential habitat for nest building and hibernation is available on the site.

Coast horned lizard (Phrynosoma coronatum). The coast horned lizard originally included two subspecies (both classified as species of special concern by Jennings and Hayes (1994) but most authors (e.g., Stebbins 2003) no longer recognize these as valid subspecies. The entire species within California is now considered a species of special concern. The California horned lizard occurs primarily in open grassland or chaparral (sometimes in forested areas) with large sunlit areas for basking.

Site Occurrence. Numerous records for the coast horned lizard exist from the Carmel Valley and especially from the coastal dunes of Monterey County (California Academy of Sciences 2005, Museum of Vertebrate Zoology 2005). No coast horned lizards were observed in the Project Vicinity during the surveys, but suitable habitat seemingly occurs along the roads that parallel the Carmel River and along the Carmel River downstream from the CVFP.

California legless lizard (Anniella pulchra). The California legless lizard is a California species of special concern. It occupies sand dune and streamside habitat throughout coastal California as far north as Watsonville, Monterey County, but it is spottily distributed and occurs only where soil and forage conditions are suitable (Miller 1943). The presence of bush lupine often indicates that habitat conditions are suitable for legless lizards (Stebbins 2003).

Site Occurrence. California legless lizards are abundant in Monterey County. The black form of this distinctive lizard (formerly *Anniella pulchra nigra*, no longer taxonomically recognized) is well known from the Monterey Peninsula and the coastal dunes north to Watsonville, but does not appear to range inland into the Salinas, Pajarro, or Carmel River basins (Jennings and Hayes 1994). The “silvery” form (formerly *Anniella pulchra pulchra*) is known from several sites along the Salinas River in Monterey County but is not currently known from the Carmel Valley. The absence of sandy dune or loamy streamside habitat along the Carmel River may preclude its occurrence in the valley. No California legless lizards were observed during the surveys for this project, but specialized techniques for finding them, such as raking through plant litter under bush lupine, were not employed.

Two-striped garter snake (Thamnophis hammondii). The two-striped garter snake is a California species of special concern. This distinctive snake is so-named because it possesses a lateral stripe on each side of the body but is lacking the distinct mid-dorsal stripe that many other garter snake species possess (Rossman et al. 1996). It occupies the margins of sunlit rocky streams and feeds primarily on small fish (Stebbins 2003), and can be distinguished from other garter snake species that occur in the same region by its absence of red lateral coloration and mid-dorsal stripe (Stebbins 2003; S. Barry, pers. obs.).

Site Occurrence. Jennings and Hayes (1994) indicate that the two-striped garter snake still occurred along much of the Carmel River (in 1994), which is near the northern limit of the species' range. Two-striped garter snakes were observed in the Carmel River arm of San Clemente Reservoir during the 2003 and 2005 drawdowns, and much of San Clemente Creek and the Carmel River above San Clemente Reservoir appears to offer suitable habitat and forage for this species.

Birds

Bald eagle (Haliaeetus leucocephalus). The bald eagle is a California Endangered Species. Formerly listed as threatened under the ESA, the species was publicly announced as delisted on June 28, 2007. Bald eagles require relatively large bodies of water containing standing populations of suitable-sized fish, and waterfowl supplement their diet. Nests, typically in large conifers in relatively secluded locations, are usually located within one mile of key foraging areas. Bald eagles are resident in California. They begin nesting (incubating) in late February through March, and young fledge by July. The California bald eagle breeding population now exceeds 115 breeding pairs, primarily concentrated in the north. Many more bald eagles visit California as winter migrants.

Site occurrence. No bald eagles were found during visual surveys in the Project Area. San Clemente Reservoir may not be large enough to provide breeding habitat for bald eagles; however, eagles may use several smaller reservoirs or river reaches within their territory, often covering distances exceeding 10 miles. Therefore, San Clemente Reservoir is potential foraging habitat and low suitability breeding habitat for bald eagles. The nearest known bald eagle nest occurs on the Nacimiento River in southern Monterey County (K. Sorenson, Ventana Wilderness Sanctuary, unpub. Report cited in Denise Duffy & Associates 2000). Bald eagles are more likely to utilize San Clemente Reservoir as winter migrants.

Golden eagle (Aquila chrysaetos). The golden eagle is a California species of special concern. These large birds nest on high (>30 ft.), vertical cliffs and in trees. They hunt mostly mammals over open habitats such as savanna or desert scrub, usually in mountainous or canyon country. Industrial, agricultural, and residential development is increasing in golden eagle foraging and nesting habitat, and the status and trends of the California golden eagle populations is currently tracked.

Site occurrence. The Carmel River canyon in the vicinity of the Project Area is predominately woodland or chaparral-type habitat and, therefore, contains only marginal habitat for golden eagles, which prefer to hunt in open grasslands or oak savanna. Golden eagles may nest in woodland areas if open areas are located nearby for foraging; potential nesting substrate does occur in the Project Area. The nearest reported golden eagle nest was found in Canada Canyon in 1991 (BioSystems Analysis

1991). Abundant foraging habitat occurs elsewhere on the hills surrounding Carmel Valley.

Cooper's hawk (Accipiter cooperi). The Cooper's hawk is a California species of special concern. Cooper's hawk nesting habitats include riparian deciduous, live oak, or second-growth conifers, usually near stream courses in dense stands with relatively high crown closure and open understory. Accipiters partition food on the basis of size and prey type: Cooper's hawks prey on equal proportions of medium-sized birds and small mammals. Although the Cooper's hawk once commonly nested throughout California, loss of riparian woodlands by logging and stream modification has resulted in a steep decline of nesting birds (Small 1994). Egg laying typically occurs in late April or early May, and young fledge in July.

Site occurrence. Suitable breeding and foraging habitat occurs in the Project Area in oak and riparian woodlands. One active Cooper's hawk nest was observed near the Carmel River, just north of the CVFP adjacent to Settling Pond Number 1. The nest was located approximately 15 meters southeast of the pond near the forest edge in a 20 meters tall live oak. It was active and contained two young in 1997. This nest was again observed in July of 1998 and was found to be active with two to three young birds near the nest. No other Cooper's hawk nests were found in the Project Area.

Osprey (Pandion haliaetus). The osprey is a California species of special concern. Osprey require relatively large bodies of water containing standing populations of suitable-sized fish. For nesting, they utilize snags or snag-top conifers, and tolerate a greater human presence near their nests than do bald eagles. Osprey nesting populations are concentrated in the northern coastal and mountain regions of California. The coastal breeding range of osprey extended north of San Francisco Bay in the 1980's, and was reportedly expanding at that time (Henny and Anthony 1989).

Site occurrence. A single osprey was observed hunting in the open water of San Clemente Reservoir in May 1997. The osprey also carried a stick into a live oak tree, but no nest was found. No other subsequent observations were made of osprey in the Project Area. San Clemente Reservoir may be a portion of the foraging range for osprey breeding at some unknown location in the area and should be considered suitable foraging habitat and potential nesting habitat.

Yellow warbler (Dendroica petechia brewsten). The yellow warbler is a California species of special concern. A common to uncommon summer resident, yellow warblers breed in a variety of habitats, but primarily occur in riparian deciduous woodlands and shrub habitats. They have experienced sharp declines in lowland portions of the state, largely due to loss of riparian habitat and from nest parasitism by brown-headed cowbirds.

Site occurrence. Evidence of yellow warbler breeding activity was found at two sites in the Project Area: 1) near the CVFP, in deciduous trees surrounding Settling Pond

Number 1 and 2) in riparian trees along the Carmel River downstream of the proposed batch plant location. Yellow warblers were detected singing during both May and July site visits and assumed nesting, although no actual nests were seen. No other yellow warblers were found in the Project Area, although suitable habitat occurred in riparian habitats along the Carmel River upstream of the CVFP.

Double-crested cormorant (Phalacrocorax auritus). The double-crested cormorant is a California species of special concern. This species is found along the coast and at larger freshwater lakes and reservoirs, rivers, and marshes; it nests on offshore islands, and inland on the margins of lakes, sloughs, and large rivers. Nests are located on cliffs and tall trees or snags. Double-crested cormorants no longer breed in the Sacramento or San Joaquin Valleys, and they have declined along the central and southern California coast. Their decline is attributed to habitat loss and human disturbance of nesting sites, especially by boats.

Site occurrence. Because of its small size, San Clemente Reservoir is probably marginal nesting habitat for double-crested cormorants. The reservoir may provide foraging habitat for wintering cormorants.

Sharp-shinned hawk (Accipiter striatus). The sharp-shinned hawk is a California species of special concern. Sharp-shinned hawks nest in a variety of habitats including deciduous riparian forest but are more commonly associated with dense stands of smaller conifers. They often hunt near openings, using adjacent woodland for cover. The sharp-shinned hawk formerly bred only in small numbers in California. Although their breeding population appears to be greatly reduced, data are lacking or old (Remsen 1978). Larger numbers of migrant sharp-shinned hawks winter in the state.

Site occurrence. Sharp-shinned hawks were formerly a common summer resident in adjacent Santa Cruz County, and there are historical nesting records along the river bottom of the Carmel River (Grinnell and Miller 1944). There is suitable nesting habitat for sharp-shinned hawks in the Project Area; however, they are more likely to be present as winter migrants.

Yellow-breasted chat (Icteria virens). The yellow-breasted chat is a California species of special concern. Yellow-breasted chats use riparian thickets and other brushy habitats near water when breeding. They have experienced sharp declines throughout much of California, largely due to loss of riparian habitat and nest parasitism by brown-headed cowbirds.

Site occurrence. No yellow-breasted chats were detected during field surveys but suitable breeding thickets occur along the Carmel River downstream of the CVFP.

Other Species

Smith's blue butterfly (Euphilotes enoptes smithi). Smith's blue butterfly is federally listed as endangered. This species typically occurs in coastal locations but can also occur on inland sites. Two species of buckwheat, dune buckwheat *(Eriogonum parvifolium)* and seaside buckwheat *(E. latifolium),* are the preferred host plants for this butterfly.

Site occurrence. Dr. Richard Arnold conducted a survey of the study area for Smith's blue butterfly in June 1997. On the date of the survey, Smith's blue butterflies were observed and found to be active at previously known locations in Sand City and in western Carmel Valley. The survey was also timed to coincide with the flowering period of dune buckwheat and seaside buckwheat. No Smith's blue butterflies were observed during the project site survey. Neither host buckwheat occurs within the study area. Two related butterfly species, Acmor blue *(Plebejus acmon)* and Tilden's blue *(Euphilotes enoptes tildeni,* were observed in the study area. Based on the lack of preferred host plants in the study area, and the presence of related species that generally do not occur with Smith's blue butterfly, it is unlikely that Smith's blue butterfly occurs in the study area.

Monterey dusky-footed wood rat (Neotoma fuscipes luciana). This subspecies of the dusky-footed wood rat is a California species of special concern. It is common to abundant in deciduous and evergreen woodland habitats that provide dense overstory and understory cover. It can also be commonly found in chaparral, coastal scrub, and riparian habitats. Wood rats build houses of sticks, bark, leaves, and other forest debris at the base of, or within the canopy of a shrub, tree, or other structure.

Site Occurrence. A single Monterey dusky-footed wood rat nest was observed (Ecosystems West 1997) along the lower portion of Tularcitos Creek. The nest appeared to be recently occupied, with fresh plant material placed in the nest. A second nest was observed above the unpaved portion of Center Court Drive near Settling Pond Number 2. Suitable habitat is available for wood rats throughout the project site, including woodland, chaparral, and riparian habitats.

Townsend's big-eared bat (Plecotus townsendii townsendii). The Townsend's big-eared bat is a California species of special concern. It is widely distributed throughout California; its habitats include coastal forests and woodlands. Big-eared bats primarily use caves, but are also known to use mines, tunnels, barns, attics, and abandoned buildings that mimic cave environments. This species is most common in moist habitats.

Site Occurrence. Appropriate roosting sites do not occur on the project site. However, there are structures on the project site that might become suitable if abandoned and left standing. The valve house atop SCD is believed to harbor a day roost of at least one unidentified bat species.

California mastiff bat (Eumops perotis californicus). The California mastiff bat is a California species of special concern. This large bat is uncommon in much of California. The mastiff bat occurs in semiarid to arid habitats including deciduous and evergreen forest, coastal scrub, chaparral, grasslands, and urban areas.

Site Occurrence. This species may roost with other bat species, and according to CNDDB records for elsewhere in California it commonly roosts in anthropogenic structures such as houses and out buildings. Among two areas where roosting bats were identified during 1997, none of the individuals was a mastiff bat. The valve house atop SCD is believed to harbor a day roost of at least one unidentified bat species.

Pallid bat (Antrozous pallidus). The pallid bat is a California species of special concern. Pallid bats are very widely distributed across the lower elevations of California. The pallid bat occurs in habitats ranging from mixed conifer forest to arid desert regions. Rock outcrops and large hollow trees, for roosting appear to be an important part of the habitat structure.

Site Specific Occurrence. Appropriate roosting locations on the project site occur adjacent to the existing low road and potentially in anthropogenic structures within and near the Project Area, possibly including the valve house atop SCD. The rocky surface upslope of the road is the most appropriate place for pallid bats to roost on the site and bats may be present in this area. However, this species was not observed among two areas where other roosting bats were identified.

2030 Baseline Conditions

If current conditions at San Clemente Reservoir persist through 2030, San Clemente Reservoir, San Clemente Creek, and the Carmel River would continue to change through this period. San Clemente Reservoir would fill with sediment within 6 to 10 years and annual drawdowns would cease at that time (see Sections 4.2 Hydrology and Water Resources and 4.4 Fisheries). The reservoir would eventually become a floodplain stabilized by riparian vegetation. The riparian growth that is currently inhibited by the annual drawdown would stabilize and shift boundaries only as flood events periodically alter the floodplain. Increasingly dense riparian growth would probably increase the population densities of special-status riparian bird species including Cooper's hawk, yellow warbler, and yellow-breasted chat. However, complete sedimentation of the reservoir would render the site uninhabitable for open-water birds such as double-crested cormorant, bald eagle, and osprey. If current anthropogenic structures in the vicinity of SCD remain intact and unaltered through 2030, the local bat population, potentially including special-status bat species, would probably remain unchanged, although age-related anthropogenic structure changes might affect bat colony size and roost function. If current conditions remain through 2030, the local population of Monterey dusky footed wood rats seems unlikely to change because floodplain stabilization within the reservoir would affect wood rat habitat minimally. The greatest changes that would result from stabilization of current conditions through 2030 would be to amphibian and reptile populations. The floodplain would probably incorporate overflow pools and backwaters that would tend to favor CRLF population growth and bullfrog population would decline. Western pond turtles would also benefit from floodplain stabilization because the stream courses of the Carmel River and San Clemente Creek would remain wide and deep enough to offer sufficient forage and cover. Flood events would scour the streams periodically and renew vegetation-growing surfaces, which would foster forage development. Habitat for the two-striped garter snake would increase over the current availability in the reservoir, but foothill yellow-legged frog rocky stream habitat availability would probably not change.

Should existing conditions persist through 2030, the plunge pool downstream of SCD would probably decline substantially in diameter and depth and become a naturally leveed channel stabilized by new riparian growth. Such a channel might offer improved potential spawning or summer habitat for CRLFs, but only if summertime flows decline sufficiently to preclude scouring. Habitat availability downstream for all of the other special-status species discussed in this section would probably remain unchanged downstream of the Dam.

In the San Clemente Reservoir sediment plain (Reach 3) gentle incision of the meandering channel into the coarse sands would probably allow for the development of young riparian communities. This is already being observed on the San Clemente sediment plain since the gates have been permanently lowered since 1995. Much of the San Clemente arm and the much larger Carmel River arm of the sediment plain already have fairly extensive areas of localized riparian scrub, very young riparian forest, willow clumps and islands, sedge meadow, isolated seasonal and perennial ponds, and fringe growth of alders and emergent riparian wetland vegetation. Larger floods, like the 1998 flood, would continue to scour large portions of the young riparian growth. Therefore the sediment plain is likely to remain patchy and dynamic. However, as increasingly coarse sediment and large woody debris are deposited on the terraces and help to stabilize them and as channel patterns develop into more incised meanders (less braided) an increased number of large patches of more mature riparian woodland and forest habitat would develop (Denise Duffy & Associates 2000).

Reach 4 (downstream of the SCD) has hard banks and the upper portion of Reach 5 has relatively hard banks and moderate gradients that would experience sediment accumulation on bars, benches, and low overflow channels. Based on the observed deposition of sediment in these areas from the 1982, 1986, 1995 and 1996 flood years, the effect of finer substrate deposition should be positive. These lower fluvial landforms are supporting different but relatively even-aged stands of riparian vegetation. These vary from little complexes of cottonwood-sycamore-willow-alder on the older deposits, to even-aged stands of alder and willow, to young herbaceous growth on the youngest bars. Even-aged alders and river sedge were observed lining the banks at localized bank failures, which could be dated to major 1982 flood years. Locations where the coarse sand and sediment was not deposited were often cobbly and relatively devoid of cover. Large episodic floods and deposits of sand could scour, bury, and kill recently established riparian and brushy habitats near water. These habitats may support riparian birds like the yellow warbler and yellow breasted chat. Since these reaches are hard and have a steeper gradient, they are less subject to bank failure and loss of mature riparian vegetation, even in smaller episodic events (Denise Duffy and Associates 2000)

Softer banks occur in the lower portion of Reach 5 in the Robles del Rio area and increasingly downstream through reaches 6 and 7 and the upper portion of Reach 8. In areas with softer banks, the river channel would become wider and shallower. Deposition and low flow channel migration would be likely to smother or remove young herbaceous and riparian scrub communities on the less stable bars, benches and terraces. Localized losses of older, higher riparian woodland and forest habitat could occur where historically incised soft banks are subject to channel widening and bank loss, especially the outside bends of sandy soil terraces with discontinuous riparian cover and root stabilization (Denise Duffy & Associates 2000).

Extensive areas of bare sandy flood plain and braided channels would be created when episodic events deposit large to very large amounts of material especially if they occur early in the project life. This could be particularly adverse if the widening occurs in places where there are only remnant riparian woodland/forest strips that would be totally lost (such as the lower and middle portions of Reach 6). However, less destructive, smaller and later-occurring episodic events could result in the development of extensive bars, benches, overflow channels, and low terraces that could become wooded during long periods of normal flows. As this riparian woodland and forest becomes more established and develops strong root systems, future episodic events would have less destructive effect. A complex depositional and erosion pattern with blowouts, terrace scour holes, and trapping of large woody debris could lead to a complex of riparian and wetland habitats of different ages. Increased habitat complexity and diversity could support an associated variety of riparian reptiles, amphibians, and birds (Denise Duffy & Associates 2000).

Reach 8 (especially the lower two thirds) and the upper portion of Reach 9 have finer grained alluvial soils, with more extensive riparian forest and root stabilized banks. These conditions are combined in numerous locations with hardened banks and a relatively straight and narrow river channel with good conveyance. Therefore, there would be less likely to be significant bank migration and loss of riparian vegetation in this reach. Substantial filling of the active channel would bury or create habitat favorable for growth of a succession of complex of riparian habitats. Minor changes that do occur are more likely to be due to localized conditions (which are relatively short lived) as sediment transport through this reach is relatively efficient. The major sediment volume would be derived from tributaries and the bed and bank of the lower river itself, rather than being directly attributable to releases from SCD. Localized outside bend bank failures and toe of bank failures (more likely in the upper portions of Reach 8) may result in localized loss of thin strips of mature riparian woodland and forest vegetation in this relatively wider riparian corridor. This reach has only very localized opportunities for creation of smaller, more isolated and discontinuous bars and benches for seral herbaceous, shrub, willow scrub and woodland succession (Denise Duffy & Associates 2000).

The complex of riparian, wetland, and coastal dune habitats associated with the lagoon and the associated riparian forest above the lagoon would not be expected to change appreciably due to release of sediment over SCD. The dynamics of this area are controlled by other factors (Denise Duffy & Associates 2000).

4.5.2 ENVIRONMENTAL RESOURCES IMPACT STANDARDS AND METHODS

Standards of Significance

The following standards were obtained from the CEQA Appendix G Environmental Checklist Form for biological resources. An adverse impact on vegetation or wildlife would be significant and would require mitigation if construction or operation would:

- Have a substantial adverse effect either directly or through habitat modifications, on any species identified as a threatened or endangered, candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Permitting Issues

One of the requirements for the Proponent's Proposed Project as well as for Alternatives 1, 2, and 3 is the issuance by the USACE of a Clean Water Act Section 404 permit to dredge or fill Waters of the U.S. The application for a Section 404 permit for the Proponent's Proposed Project has been filed with the USACE. Section 7 of the ESA requires the USACE to consult with USFWS and NMFS whenever listed species may be affected by the action to be permitted. In this case, USFWS will be consulted concerning the CRLF, and NMFS will be consulted concerning the California South Central Coast steelhead trout. During this process, the USACE will prepare Biological Assessments for the relevant species and submit them to the respective agency. USFWS, in turn, will prepare a BO for the CRLF and NMFS will prepare a BO for the steelhead. If the action is found not to jeopardize the continued existence of the species, each BO will provide for appropriate mitigation to be made conditions of the Section 404 permit. The USFWS and NMFS each will include an "incidental take" statement as part of their BO if it appears that some individuals of the listed species will be lost as a result of the permitted action. This ESA consultation process will proceed in parallel with NEPA review. The final Section 404 permit mitigation conditions could be the same as or in addition to any required NEPA/CEQA mitigation; ultimate jurisdiction over the selection, implementation and monitoring of mitigation measures lies with the appropriate federal agency.

Impact Assessment Methodology

Biotic resources surveys of the project study vicinity were conducted by Ecosystems West from April to August, 1997, with follow-up surveys during July 1998. Dr. Richard Arnold conducted a survey for Smith's blue butterfly in June 1997. ENTRIX, Inc. conducted additional field surveys from April to August 2005, including vegetation and special-status plant surveys. Special-status plant species surveys were conducted in May and July 2005. The 2005 plant survey report is provided in Appendix T. Surveys were conducted throughout the Project Area, including along the Tularcitos access road and existing access roads requiring improvements, at the concrete batch plant site, at the Dam itself (including the fish ladder), at the sediment disposal site, along the conveyor route to the sediment disposal site, and in those areas where sediment would be excavated.

Several special-status terrestrial wildlife species are known to occur or may occur in the Project Vicinity (MPWMD 1984). A list of special-status wildlife species with potential to occur in the Project Area was developed based on a review of literature and data sources that span over 90 years, including general wildlife references (Ingles 1965; Call 1978; Stebbins 2003; Small 1994); CDFG reports on special-status wildlife (Remsen 1978; Williams 1986; Jennings and Hayes 1994); California Wildlife Habitat Relationships (CWHR) species-habitat models (Zeiner et al. 1988, 1990a, 1990b), records from the CNDDB (CDFG 2005a), the catalogue records of the major northern California vertebrate museum collections (California Academy of Sciences 2005, Museum of Vertebrate Zoology 2005). Also used were records of known occurrences of special-status wildlife species and habitats in the region, previous wildlife studies conducted in the area, and consultant staff biologist's experience with the target species from the 2000 RDEIR.

Existing resource information and the results of the field studies conducted in 2005 were used to develop the description of the environmental setting. The resources described in that section were evaluated in conjunction with the activities associated with the Proponent's Proposed Project and the alternatives to determine potential impacts and develop mitigation measures.

Amphibian Surveys

ENTRIX biologists conducted amphibian surveys in 2005 to supplement those conducted earlier by other groups as specified in the section "Impact Assessment Methodology." The primary goals of the 2005 surveys were to determine the limits of pond and pool habitat upstream of San Clemente Reservoir along both major tributaries that could support CRLF spawning and to locate other special-status amphibian and reptile species in the same reaches. The biologists surveyed these reaches on 12 and 13 July 2005, from early morning through late afternoon. They used information from the USFWS (1996) site assessment guidance for CRLFs as a framework for determining habitat potential. The biologists waded upstream at least one mile from the perceived terminus of the reservoir influence and returned downstream along waterways, noted pond and pool habitat, using binoculars to search for reptiles and amphibians along the shoreline and in the water. Although the primary objective was to assess habitat rather than to find individual amphibian and reptile specimens, special-status species were noted and mapped wherever they were found.

4.5.3 IMPACTS AND MITIGATION

The following impact issues, all related to construction, have been defined for Terrestrial Biology resources:

Impacts to Vegetation

- VE-1: Special-Status Plant Species (effects on virgate eriastrum or Lewis's clarkia populations)
- VE-2: Loss of Protected Oak Woodland (loss of oak woodlands)
- VE-3: Loss of other Native Vegetation (loss of native vegetation)
- VE-4: Indirect Effects on Native Vegetation (effects caused by increased erosion and sedimentation)

Impacts to Wildlife

- WI-1: Dam Strengthening (disruption of bat nesting habitat)
- WI-2: Removal of Ancillary Facilities (displacement of special-status bats)
- WI-3: Cofferdam Construction and Plunge Pool Dewatering (adverse effects to special-status species)
- WI-4: Notching Old Carmel River Dam (OCRD) (effects on spawning habitat and herpetofauna)
- WI-5: Concrete Batch Plant Construction and Operation (habitat for special-status species)
- WI-6: Tularcitos Access Road Construction (effects to special-status species)
- WI-7: Reservoir Drawdown (effects on California red-legged frog [CRLF] habitat)

- WI-8: Vegetation Removal (effects on special-status bird species and others protected by the Migratory Bird Treaty Act or raptor protections).
- WI-9: Pre-Existing Access Road Improvements (effects to special-status species)
- WI-10: Reservoir Drawdown or Elimination with Sediment Removal (effects on California red-legged frog [CRLF] habitat)
- WI-11: Sediment Removal (destruction of spawning habitat)
- WI-12: Sediment Transport and Disposal (adverse effects to special-status species)
- WI-13: Bypass Channel Excavation (loss of habitat for special-status species)

All of the above issues are construction-related impacts.

Proponent's Proposed Project (Dam Thickening)

Wildlife Impacts WI-2, WI-10, WI-11, WI-12, and WI-13 do not apply to the Proponent's Proposed Project.

Issue VE-1: Special-Status Plant Species

Effects on virgate eriastrum or Lewis's clarkia populations
Determination: ***less than significant with mitigation, short-term***

IMPACT

Populations of one special-status species were found near the Tularcitos Access Route. Some direct loss of the virgate eriastrum population could occur near the edge of the batch plant footprint. However, virgate eriastrum is on List 4 of the CNPS Inventory, and does not fall under specific state or federal regulatory authority.

MITIGATION

To the extent possible, potential impacts from construction activities would be avoided by avoiding populations of CNPS List 4 species.

Issue VE-2: Loss of Protected Oak Woodland

Loss of oak woodlands
Determination: ***less than significant with mitigation, long-term***

IMPACT

Construction activities could result in loss of 1 acre of oak woodlands protected by the Monterey County Oak Protection Ordinance. Construction of the Tularcitos Access Route would require the removal of coast live oak trees, and improvements to other access routes may also result in oak losses.

MITIGATION

Impacts to the stand of blue oak series would be avoided by confining the "high road" access improvement activity in the vicinity of this stand to the north side of the existing road. Fencing would be used to prevent construction activity from encroaching into the blue oak stand on the south side of the road.

The Botanical Resources Management Plan (Appendix U) would be finalized and implemented immediately following construction, with the following elements from the Monterey County Oak Protection Ordinance:

- Replace up to half the oak trees removed by access road and right abutment wall construction at a 3:1 ratio by planting seedlings or potted trees in appropriate habitat under the supervision of a qualified botanist;
- Derive all plant material from Carmel Valley area populations;
- Monitor plantings for at least five years after planting;
- Replant seedlings as necessary to replace seedlings that do not survive;
- Take other remedial action as necessary, including irrigation or protection from browsing animals such as deer, to ensure long-term survival of the plantings per the requirements of Title 16, Chapter 16.60, Monterey County Code;
- Provide or acquire a conservation easement sufficient to mitigate at least half the loss of oak trees, per Monterey County Code. The conservation easement would consist of lands elsewhere in the Carmel River watershed that support undeveloped blue oak stands.

Monterey County would be the regulatory authority responsible for oversight.

Issue VE-3: Loss of Other Native Vegetation

Loss of native vegetation
Determination: ***less than significant with mitigation, long-term***

IMPACT

Project activities are expected to result in loss of native vegetation, including several types of sensitive riparian habitat and oak woodland habitat.

The acreage of vegetation cover type that would be lost as a result of the Proponent's Proposed Project implementation is provided in Table 4.5-1. The total acreage of vegetation that would be lost is 3.4 acres. This number includes only the small portion of the Project Area that would be displaced by a constructed structure (i.e., the dam thickening, construction of the concrete batch plant, construction of the Tularcitos route, and improvements to the OCRD Bridge and other access routes). In addition, an unquantified amount of riparian vegetation, as described in the sections below, could be lost due to de-watering and diversion.

Access Road Improvements

Improvement of existing roads for Proponent's Proposed Project access including access to the batch plant, plunge pool and upper dam face would result in some minor removal of native vegetation, including sensitive habitat due to widening and associated grading for large vehicles and construction equipment. The Project plans call for the access routes to be a 12-foot wide, one lane two-way road with radio traffic control. Widening would be required only in two segments totaling approximately 120 linear feet. The existing roads proposed for improvement pass through extensive areas of sensitive coast live oak series habitat that would likely be affected by the 120 linear foot widening.

The small area of sensitive blue oak series is located along the existing "high road" proposed for improvement and could also potentially be affected by road widening. Some sensitive central coast cottonwood-sycamore riparian forest habitat below SCD could be removed or disturbed by improvement of the plunge pool access road on the right (east) bank of the river; however, efforts would be made to minimize removal of trees. The pipeline access road would require widening of three narrow stretches and improvement to the switchback corner. Although the overall area to be disturbed and the number of trees potentially removed by the access road improvements are estimated to be relatively small, mature trees of coast live oak or riparian species would be removed.

Concrete Batch Plant

The proposed location of the batch plant is in open, disturbed grassland with scattered coast live oak, western sycamore, and mock-heather. Construction of the batch plant facility in this area would require some minor oak tree and mock-heather pruning and removal to access the site and incorporate the plant batching facilities and material stock piles. At least four oak trees in the open grassland would be removed to accommodate the batch plant and lay down area (Denise Duffy & Associates 2000).Other trees would be trimmed to provide access to the site. Mature trees of coast live oak or riparian species would be removed.

Table 4.5-1: Vegetation Type and Acreage Potentially Affected by Proponent's Proposed Project and Alternatives

Alternative	TOTAL	Annual grassland	Arroyo willow series	Blue oak series	Black sage series	Central Coast cottonwood-sycamore riparian forest	Chamise series	Chamise-black sage series	Coast live oak series	California sagebrush - black sage series	Developed	Emergent wetland	Mock heather scrub	Mulefat series	Mulefat-willow riparian	Ruderal	Sandbar	Sandbar annuals	California sycamore riparian-coast live oak	California sycamore riparian-mock heather scrub	California sycamore series	White alder riparian	White alder-willow riparian	Willow riparian
Proponent's Proposed Project	3.4	0.2	0.02	0.003	0.004	0.7	0.1	0.08	1.0	0.04	0.04	0	1.0	0	0	0.05	0	0	0.02	0.2	0.04	0	0	0
Alternative 1	41.8	3.8	0	0.003	0.004	1.3	0.6	0.6	20.1	0.1	0.2	0.02	0	0	0.02	0.01	0.4	1.8	0	0	0.04	0	11.9	1.0
Alternative 2	61.4	6.6	0	0.003	0.004	1.3	1.0	1.1	26.3	0.3	0.2	0.02	0	1.2	0.6	0.01	2.7	1.8	0	0	0.04	0.1	17.0	1.0
Alternative 3	44.7	7.1	0	0.003	0.1	0.2	1.5	0.3	9.6	0.0	0.04	0.02	0	1.2	0.6	0.01	2.0	1.8	0	0	0.04	0.1	18.9	1.0
Alternative 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Plunge Pool Area

Removal of or disturbance to some sensitive central coast cottonwood-sycamore riparian forest habitat could occur due to construction activities in the plunge pool area. Although most construction activity would take place in the dewatered plunge pool area, some riparian forest habitat may be removed in order to improve the plunge pool access road (described previously). The extent of riparian vegetation that may have to be removed would be minimal because the access road would be maintained as one-lane with radio control and abandoned and restored to its previous state after construction.

Left Abutment Staging Area

Use of the proposed left abutment staging area would likely require removal of some native vegetation, including sensitive habitat, on the upland between the access road and the canyon wall. Impacts, including removal of oak trees, could occur to coast live oak series habitat in this area.

Right Abutment Wall

The extension of the new 30 to 40-foot wall along the right embankment to tie the Dam into bedrock may result in the removal of a few mature trees on and at the base of the slope immediately adjacent to the right abutment. These could include coast live oaks as well as riparian species (California sycamore, polished willow). A small amount of chamise-black sage series habitat may also be removed as a result of construction of the new wall.

Diversion of Carmel River and San Clemente Creek

In order to avoid high turbidity in water released downstream during construction, the Carmel River water would be diverted into a pipeline and conveyed downstream of the Dam. A similar diversion may be required for San Clemente Creek. These diversions would result in the dewatering of the bypassed area. Lowering of the reservoir could dewater stands of emerging alder currently sprouting around the reservoir fringe. Diversion of water from the natural river channel below the Dam could result in local dewatering of riparian forest vegetation on adjacent banks.

MITIGATION

Appendix U, the Botanical Management Plan, includes provisions for restoration, mitigation, and monitoring of vegetation affected by the project. The USACE and CDFG would have regulatory authority over the measures in the Botanical Management Plan. The following mitigation activities have been summarized from Appendix U:

The proposed access road improvements, the batch plant and laydown areas, plunge pool access, and the abutment staging areas would be designed to minimize loss of native vegetation. Unnecessary clearing of, or disturbance to, native vegetation outside the road right-of-way would be avoided.

Fencing would be used to prevent any encroachment of vehicles or project activity into undisturbed native habitat or within the dripline of native trees outside the designated batch plant and laydown site, the plunge pool area and the left and right abutment areas.

Project outflows would be designed to diffuse water rather than allow it to flow out in a concentrated stream. Outflows would be placed so as to minimize bank erosion from altered flows. The temporary outflow below the plunge pool would be designed to minimize alterations of the hydrologic regime that support the riparian forest habitat on the adjacent floodplain.

Supplemental irrigation would be provided to alders around the reservoir fringe when the reservoir is dewatered and to riparian vegetation above the bypass outflow.

Disturbed areas or areas of annual grassland habitat between the left abutment and the existing residence would be used to the maximum extent available for the left abutment staging area.

Riparian forest would be revegetated at a 3:1 ratio for trees removed, including the cottonwood-sycamore riparian forest below SCD at the plunge pool staging area and access road, and any riparian species disturbed at the site of the right abutment wall.

The CDFG would be the regulatory authority responsible for oversight of the riparian vegetation. Monterey County would be the regulatory authority responsible for oversight of the replacement of the oak trees.

Issue VE-4: Indirect Effects on Native Vegetation

Effects caused by increased erosion and sedimentation
Determination: ***less than significant with mitigation, short-term***

IMPACT

Project construction activities may result in indirect adverse impacts to vegetation, including increased erosion and sedimentation, damage to roots of oaks and other tree species adjacent to areas where heavy equipment would be operated, dust impacts to roadside vegetation, and colonization of exposed substrate by exotic plant species.

MITIGATION

Standard erosion and sedimentation control BMPs would be implemented for all grading, filling, clearing of vegetation, or excavating that occurs in site preparation (see Section 4.3 Water Quality and the Botanical Resources Management Plan (Appendix U) and SWPPP in Appendix K). Road widening would be designed to avoid placing fill above canyon walls.

With the assistance of a qualified hydrologist, all road widening and improvements would be designed to avoid or minimize alterations of existing drainage patterns that could lead to increased erosion and sedimentation. Appropriate erosion control technology (BMPs) would be employed during all phases of access road construction (see Section 4.3 Water Quality and the Botanical Resources Management Plan (Appendix U) and SWPPP in Appendix K). Construction work would be scheduled to occur during the dry season.

Excavation and operation of construction vehicles off of the right-of-way would be prohibited within the dripline of oak and other tree species.

To minimize dust, unpaved access roads would be frequently watered using a sprayer truck during periods when trucks and other construction vehicles are using the roads, except during periods when precipitation has dampened the soil enough to inhibit dust (see Section 4.7 Air Quality).

Cut slopes, fill areas, denuded areas, and any other areas where existing vegetation cover would be removed outside the roadway would be revegetated with an appropriate seed mix. This seed mix would be selected with the assistance of a qualified revegetation specialist with demonstrated experience and expertise in revegetation, and would contain native species that are indigenous to the Project Area. If enough native seed is not available, and non-natives must be included in the seed mix, these would be species known not to be invasive or persistent. The seed mix would contain native species known to compete well against invasive non-native species.

Monitoring would be conducted by a qualified hydrologist and revegetation specialist of all revegetated areas and all areas identified as potential problem areas for erosion and sedimentation from access road construction. Remedial action would be implemented if revegetation were not successful or if significant erosion and sedimentation problems are observed during monitoring.

All revegetated or disturbed areas would be monitored annually for invasive non-native plant species, particularly French broom and pampas grass, for five years following completion of Phase 1 construction, with the assistance of a qualified botanist. If invasive species are becoming established on areas disturbed by project activities during the five-year period, invading species would be removed at times that preclude the plants from setting new seed.

Issue WI-1: Dam Strengthening

Disruption of bat nesting habitat
Determination: ***less than significant with mitigation, short-term***

IMPACT

Potential nesting or roosting habitat for bats (pallid bat, California mastiff bat, and Townsend's big-eared bat) occurs in rock crevices on the slope where the new right abutment wall would be constructed. This is a potentially significant, short-term impact.

MITIGATION

A preconstruction survey would be conducted for bat roosts in rock crevices in the right embankment area. If bats are observed nesting or roosting in the area, as set forth in Appendix V, Protection for Special Status Species, USFWS or CDFG would be notified (depending on the regulatory status of the species) and mitigation measures previously agreed-upon with the agency would be implemented. Such measures may include establishment of buffer zones or installation of exclusion barriers under the supervision of a qualified bat biologist. These mitigation measures would reduce the impact to a less than significant, short-term impact.

Issue WI-3: Cofferdam Construction and Plunge Pool Dewatering

Adverse effects to special-status species
Determination: ***significant, unavoidable, short-term; long-term beneficial with mitigation***

IMPACT

The construction of a cofferdam and subsequent draining of the plunge pool could adversely affect any CRLFs, western pond turtles and other special-status species that may be present. These species typically inhabit freshwater pools and their margins (Stebbins 2003). Draining the pool could leave western pond turtles and adult CRLFs vulnerable to predation, and larval CRLFs vulnerable to predation and to desiccation. This is a potentially significant short-term impact.

MITIGATION

The Proponent's Proposed Project and Alternatives 1, 2, and 3 would require a agreements with CDFG. Such agreements may contain conditions requiring mitigation that could be the same as or in addition to the NEPA/CEQA mitigation outlined in this document. This section 4.5 addresses NEPA/CEQA mitigation for Vegetation and Wildlife (other than fish). Fisheries resources are covered in Section 4.4 and Wetlands in Section 4.6.

See Appendix V for the Protection Measures for Special Status Species which address mitigation and monitoring of special status species affected by the project. The USFWS, NMFS and CDFG would have regulatory authority over the mitigation measures listed in Appendix V, but the Protection Measures would address the following activities:

Loss of California red-legged frogs and western pond turtles may occur during rescue operations associated with construction activities. Loss of California red-legged frogs may occur due to handling of frogs during relocation, and because some relocated frogs and tadpoles may fail to adjust to the new environment at the ponds used for relocation. Potential losses would be incorporated into the USFWS BO for the project.

Prior to the construction of the cofferdam and subsequent draining of the plunge pool, a preconstruction survey would be conducted for California red-legged frogs and western pond turtles at the plunge pool and downstream to the point at which the bypass pipeline would discharge water into the river.

The preconstruction survey for California red-legged frogs would be consistent with the most recent USFWS survey guidance (USFWS 2007). If California red-legged frogs are observed in the area, the USFWS would be notified and California red-legged frogs would be captured and relocated by a USFWS-approved biologist to nearby suitable habitat. Erosion control fencing or a similar barrier would minimize movement of frogs back into work areas. A biological monitor would accompany the crew during excavation and installation of the fence to prevent harm to frogs that may be active along the fence route. The survey and relocation program would be updated, if necessary, to be consistent with a mitigation plan to be developed in cooperation with the USFWS and to be consistent with any terms and conditions required in the BO to be developed as part of the ESA Section 7 consultation.

A California red-legged frog population monitoring and bullfrog eradication program (CRLF Program) would be developed and implemented as part of the Protection Measures (Appendix V), in consultation with the USFWS. During this consultation, the Protection Measures (Appendix V) would be finalized. The CDFG would also be consulted as part of its permitting process. The CRLF Program would assess and monitor the relative abundance of bullfrogs and CRLFs in the reservoir and its upper reaches. Relocation of CRLF would use techniques and procedures approved by USFWS and CDFG and would commence after April 15, to allow all CRLF eggs to hatch and the tadpoles to grow large enough to be easily identified and differentiated from bullfrog tadpoles.

The CRLF Program would include bullfrog eradication to remove adults, subadults, and egg masses from the reservoir and its upper reaches. Bullfrog eradication would be implemented to give the native frog species a “head start” within project-affected reaches and upstream enhancement/mitigation sites.

The bullfrog eradication program would be implemented during the construction and/or drawdown period between June and December. All methods and techniques would be lawful and in accordance with the CDFG Code. Only USFWS-approved biologists would be delegated to identify and destroy egg masses and larval forms of bullfrogs. The program would also include an assessment of bullfrog diet in order to determine the future need for any bullfrog control in the Project Area and areas nearby. Concurrent control and monitoring of other non-native predators (e.g., crayfish [*Pacifasticus leniusculus*] and centrarchid fishes) may be included in the program in order to minimize adverse impacts of the project on CRLFs and other aquatic species. The monitoring and bullfrog eradication program would be implemented for two to three years during project construction.

Monitoring of CRLF and bullfrog populations would be continued for two years following completion of the project. If monitoring conducted during and after construction activities indicate that bullfrog populations in enhancement and mitigation sites are increasing and CRLF populations are decreasing, the bullfrog eradication program may be continued for an additional two years. Annual reports would be submitted to the appropriate regulatory agencies, including but not limited to, USFWS, the USACE, and CDFG.

For a number of years, pursuant to an agreement with USFWS, CAW has implemented annual CRLF surveys of breeding and rearing sites and has conducted frog relocations along the Carmel River during the dry season in addition to constructing enhanced frog habitat in several locations. As part of the CRLF Program, additional CRLF habitat mitigation sites would be restored and monitored. Potential sites would be identified within the Carmel River and potentially in off-stream sites suitable for breeding. Qualified personnel would conduct periodic inspections of CRLF enhancement and mitigation sites to assure that habitat objectives for each site are sufficiently met, i.e., that physical conditions (e.g., basin sediment deposit and overhead vegetation) and bullfrog populations are conducive to CRLF reproduction. Mitigation monitoring would be conducted during construction and for an additional two years afterwards, for a total period of at least five years. Implementation and reporting would be concurrent with the CRLF Program described above.

If western pond turtles are observed in the area, attempts would be made by a CDFG approved biologist to capture (trap/net) and relocate western pond turtles. Western pond turtles are usually relocated to a nearby downstream pond or a pool reach of a stream. Construction fencing would be installed to prevent relocated frogs or turtles from returning to the area during the construction period.

Although potential capture and relocation of CRLF individuals could result in loss of an ESA-listed species, the measures described above, as well as compliance with future terms and conditions of the USFWS BO, would minimize the impact.

A biological monitor would be placed at the construction site for the duration of the cofferdam construction and the draining of the plunge pool. The biological monitor for amphibians and reptiles would coordinate with the fisheries biologist so that both are present during fish rescue operations. This would facilitate the safe removal and relocation of any remaining CRLFs and pond turtles. Two-striped garter snakes and common garter snakes (*Thamnophis sirtalis*) may congregate around the plunge pool as it recedes and could become a potentially serious source of predation on juvenile CRLFs and native fish. These snakes would be captured by a biologist qualified to handle special-status reptiles (two-striped garter snake) and released up to one-quarter mile downstream in the Carmel River. These measures, as well as implementation of any conditions that might be required by USFWS and DFG, including conditions that may be part of the USFWS BO, would minimize loss of special status species to the fullest extent practicable.

While it is difficult to determine whether the loss of CRLFs and other species that are not rescued or that are injured or die during rescue and relocation operations is significant, these losses along with the temporary loss of habitat for the red-legged frog cannot be fully mitigated and would be significant in the short- term. However, the CRLF Program, which is discussed in mitigation for Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) would restore additional sites as mitigation habitat for CRLFs and other species. This mitigation would improve habitat and provide a long-term beneficial impact.

Issue WI-4: Notching Old Carmel River Dam (OCRD)

Effects on spawning habitat and herpetofauna
Determination: ***less than significant with mitigation, short-term***

IMPACT

Instream work during the notching operation of the OCRD could damage CRLF summer habitat, and could possibly damage spawning habitat downstream of the Dam. It could also affect western pond turtle, two-striped garter snake, foothill yellow-legged frog, and Coast Range newt habitat or individuals. However, foothill yellow-legged frog has not been documented there. Sedimentation, elevated turbidity, and direct deposit of construction materials in the stream would be the most likely causes of impacts. This is a potentially significant short-term impact.

MITIGATION

Prior to dam notching operations, USFWS (2007) “protocol” surveys would be conducted for CRLFs along the Carmel River up to one-half mile downstream of OCRD. Other special-status aquatic species would be surveyed concurrently. If work on the Dam is interrupted for more than two weeks, protocol surveys would be repeated if the initial surveys indicated the presence of special-status species habitat or populations. CRLF populations are known to occur in this reach. The CRLF mitigation is provided in mitigation measures for Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) and in the Protection Measures (Appendix V).

The area involved is localized to the notching area allowing flow in the river to continue downstream. The sheetpiling of the notching area would occur during one construction season. With the addition of these mitigation measures, the impact would be reduced to a less than significant, short-term impact.

Issue WI-5: Concrete Batch Plant Construction and Operation

Habitat for special-status species
Determination: ***less than significant with mitigation, short-term***

IMPACT

Construction of the batch plant and associated facilities may temporarily impact available habitat for California horned lizard. Although lizards were not observed during field surveys, suitable open habitat for these lizards may occur along the Carmel River; MPWMD staff have reported seeing lizards on existing roads in the vicinity of the proposed batch plant.

CRLFs are known to occur in the Carmel River immediately adjacent to the proposed site for the concrete batch plant. CRLFs could be directly and indirectly impacted by construction and use of a concrete batch plant in this location. Constructing the concrete plant has the potential to result in destruction of upland habitat for the CRLF, and any inadvertent spill of materials could lead to contamination of the Carmel River downstream of the Project Area.

Operation of the proposed batch plant would not result in direct or indirect impacts to Cooper's hawk and yellow warblers, since the plant is more than 2,000 feet from the active Cooper's hawk nest and warbler nesting area. However, increased construction vehicle traffic from the batch plant to the dam site could cause increased noise and dust.

This is a potentially significant, short-term impact.

MITIGATION

A preconstruction survey would be conducted for California horned lizards and CRLFs. Results would be reported to the USFWS and CDFG. If horned lizards are found, standard mitigation measures would be implemented, including relocating horned lizards to a safe area outside of the area and installing erosion control fencing or a similar barrier to minimize movement of horned lizards back into work areas. The barrier would be buried at least 3 to 6 inches in the ground. Mesh size would not exceed one-half inch and material would be heavy gauge polybutylene or equivalent. A biological monitor would accompany the crew during excavation and installation of the fence to prevent harm to horned lizards that may be active along the fence route.

If CRLFs are found, CRLF mitigation would be the same as the Mitigation Measure for Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) and as specified in the Protection Measures (Appendix V).

Spill control measures would be implemented if the concrete batch plant were constructed. This measure would minimize the risk of contamination of the Carmel River downstream of the Project Area see preliminary SPCC Plan (Appendix R) .

A preconstruction survey would be conducted to determine if the Cooper's hawk nest is active at the onset of construction. If the nest is active, this would be reported to CDFG and a noise abatement program would be implemented for passing vehicles. The program would include standard mitigation measures, such as prohibiting the use of air horns or jake (engine) brakes. Construction vehicles would be prohibited from parking near the CVFP and traffic would be directed as far away from the nest as practical. Gravel or crushed rock would be placed to buffer noise and minimize dust generation in vicinity of nest (see Section 4.7 Air Quality for dust abatement measures). Existing native vegetation would be maintained between the nest and the existing road corridor, including the large valley oak tree west of Settling Pond Number 1.

These mitigation measures would reduce the impact to a less than significant, short-term impact.

Issue WI-6: Tularcitos Access Road Construction

Effects to special-status species
Determination: ***less than significant with mitigation, short-term***

IMPACT

Construction of the new Tularcitos access route could affect Monterey dusky-footed wood rat, coast horned lizard, pallid bat, CRLF, western pond turtle, two-striped garter snake, yellow warbler and other special-status wildlife species. Construction could damage or destroy a known Monterey dusky-footed wood rat nest located near Tularcitos Creek. Monterey dusky-footed wood rat habitat could be affected by vegetation and tree removal and by grading operations. Individual animals could be harmed by direct destruction of previously unknown nests. Damage to coast horned lizards could result from grading operations and direct injury or killing of individual animals. Potential impacts to special-status birds include potential disturbance to breeding individuals during the nesting season, particularly if nests occur in or adjacent to the construction sites. Impacts could include direct loss of eggs or nestlings; indirect displacement from increased noise and human presence in the vicinity of the construction activity; and a reduction in foraging habitat. Possible impacts to breeding birds will depend on a number of variables, including species affected, nest location, topographical shielding, breeding phenology, and type of construction activity. Damage to potential pallid bat roosting habitat would result from the destruction of rock outcrops and other formations. The impacts associated with construction would be only during CY 3.

Damage to aquatic habitat could result from erosion and other sediment and rubble discharge into the Carmel River and possibly Tularcitos Creek. This increased sediment load could further degrade habitat for the CRLF downstream of the Project Area. Impacts associated with erosion would occur during the construction phase as well as operations. This would be a potentially significant impact.

MITIGATION

Tree removal would be restricted to the minimum number of trees necessary to allow access by construction vehicles.

A preconstruction survey would be conducted for Monterey dusky-footed wood rats and wood rat nests in areas of proposed access road widening or improvement. The access road width is expected to be 20 feet or less. If wood rat nests were found, they would be reported to CDFG and flagged for avoidance. Wood rats may use more than one nest and may move from nest to nest as they forage within their home range,Their nest serves as a place of residence to store food and bear their young (Laudenslayer 1999). Due to this dependency, nests are of particular importance to wood rats and disturbance to them should be avoided. Stakes, flags or plastic tape would be used to enforce avoidance. If any wood rat nests are found that cannot be avoided, trapping and relocation of the wood rat(s) upstream or to a suitable adjacent stream nearby will be implemented according to CDFG requirements.

To the extent possible with other construction constraints, vegetation removal will be accomplished between August 1 and March 1. If any vegetation removal must be conducted between March 1 and August 1, pre-construction surveys for breeding birds (either special-status or others protected by the Migratory Bird Treaty Act and the California Migratory Bird Act) would be conducted in these areas. If any active nests were found, they would be isolated by a species-specific buffer area (from 50 to 500 feet) and avoided until the eggs were hatched and the nestlings fledged.

Effects on special-status wildlife and their habitat would be mitigated through preconstruction surveys, rescue and relocation operations, predator control, and the development of other measures through consultation based on the results of surveys. Erosion controls, including erosion control fencing, would minimize loss of construction material along existing roads that are cut into the slope of the Carmel River canyon, as well as along the plunge pool access road as specified (Section 4.1 Geology and Soils and Appendix K, SWPPP). This would minimize direct impacts to western pond turtles, two-striped garter snakes, CRLFs, and Coast Range newt from falling debris. These barriers also would keep California horned lizards and western pond turtles out of the construction and traffic corridor. Such barriers would be buried at least 3 to 6 inches in the ground.

Conducting pre-construction surveys of rock outcrops and other formations along the Tularcitos route would provide a basis for mitigating impacts to pallid bat roosts, if any are present. Surveys would be conducted by a biologist with expertise in bat biology who would use visual survey techniques and acoustic monitoring equipment to determine whether pallid bats are likely to use any of these structures. If evidence of pallid bat use is discovered, roost sites would be mapped by GPS and flagged in the field. Construction would be routed to avoid roost sites. Additional measures would be implemented at any roost site that cannot be avoided. Such measures may include establishment of buffer zones or installation of exclusion barriers under the supervision of a qualified bat biologist. More details are provided in the Preliminary Draft of the Protection Measure for Special-status Species (Appendix V).

These mitigation measures would reduce the impact to a less than significant, short-term impact.

Issue WI-7: Reservoir Drawdown without Sediment Removal

Effects on CRLF habitat
*Determination: **significant, unavoidable, short-term; long-term beneficial with mitigation***

IMPACT

The Interim Seismic Safety Measures for SCD have been conducted for five years and the same successfully implemented procedures would be utilized during construction of the Proponent's Proposed Project. However, during construction, the target elevation would be lowered to 510 ft rather than the 515.5 ft designated in the Interim Seismic Safety Measures. The reservoir drawdown would be implemented during the low flow season but would result in short-term removal of CRLF habitat in this area during CY 4 from June through December. After construction the elevation would be returned to the current baseline elevation of 525 ft.

The upper reaches of the reservoir that are currently occupied by extensive sandy sediment plains could eventually become habitat for the CRLF. At the time they were surveyed, portions of these sediment plains provided substrate for cattail and bulrush colonization. CRLFs were found in this area during the 1997 surveys of the reservoir and during the Interim Seismic Safety Measures survey and rescue operations. Lowering the water elevation could leave western pond turtles and adult CRLFs vulnerable to predation, and larval CRLFs vulnerable to predation and to desiccation. This is a potentially significant short-term impact.

MITIGATION

During fish rescue operations (see Section 4.4 Fisheries), a USFWS-approved biologist would be present to relocate any CRLFs, including subadults and tadpoles. Frogs captured would be removed and either released or relocated according to a predetermined relocation plan. The CRLF mitigation would be the same as the Mitigation Measure for Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) and as specified in the Protection Measures (Appendix V).

While it is difficult to determine whether the loss of CRLFs and other species that are not rescued or that are injured or die during rescue and relocation operations is significant, these losses, along with the temporary loss of habitat for the red-legged frog, cannot be fully mitigated and would be significant in the short-term. However, the CRLF Program, which is discussed in mitigation for Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) would restore additional sites as mitigation habitat for CRLFs and other species. This mitigation would improve habitat and provide a long-term beneficial impact.

Issue WI-8: Vegetation Removal and Construction-Related Disturbance

Effects on Special-Status Bird Species and Others Protected by the Migratory Bird Treaty Act or Raptor Protections
Determination: ***less than significant with mitigation, short-term***

IMPACT

Potential impacts to special-status birds from vegetation removal and other construction activities include potential disturbance to breeding individuals during the nesting season, particularly if nests occur in or adjacent to the construction sites. Impacts could include direct loss of eggs or nestlings; indirect displacement from increased noise and human presence in the vicinity of the construction activity; and a reduction in foraging habitat. Possible impacts to breeding birds will depend on a number of variables, including species affected, nest location, topographical shielding, breeding phenology, and type of construction activity. These impacts are potentially significant short-term impacts.

MITIGATION

To the extent possible with other construction constraints, vegetation removal would be accomplished between August 1 and March 1. If any vegetation removal must be conducted between March 1 and August 1, pre-construction surveys for breeding birds (either special-status or others protected by the Migratory Bird Treaty Act and the California Migratory Bird Act) would be conducted in these areas. If any active nests were found, they would be isolated by a species-specific buffer area (from 50 to 500 feet) and avoided until the eggs were hatched and the nestlings fledged.

These mitigation measures would reduce the impact to a less than significant, short-term impact.

Issue WI-9: Pre-Existing Access Road Improvements

Effects to special-status species
Determination: ***less than significant with mitigation, short-term***

IMPACT

The only pre-existing access road improvements for the Proponent's Proposed Project are improvements to San Clemente Drive. Widening and improving existing access roads could potentially result in minor indirect impacts to Monterey dusky-footed wood rat, pallid bat, and other special-status wildlife species. Use of the Center Court Drive access road would reduce impacts affecting known Monterey dusky-footed wood rat nest located near Tularcitos Creek, but may indirectly impact a nest that was observed above the road in July 1998.

Widening of the existing access roads may disturb trees that provide nesting structures for Monterey dusky-footed wood rats. If large amounts of fill from construction were to enter into the Carmel River this could directly injure or kill western pond turtles, two-striped garter snakes, or CRLFs. Use of the left abutment staging area, as planned, should have less than significant impacts on special-status wildlife species in the area.

These impacts are potentially significant, short-term impacts

MITIGATION

Tree removal would be restricted to the minimum number of trees necessary to allow access by construction vehicles.

Impacts to Monterey dusky-footed wood rat would be mitigated by using global positioning software (GPS) to indicate the location of the existing Monterey dusky-footed wood rat nest relative to the proposed route on project construction maps. A survey would be conducted to identify other active Monterey dusky footed wood rat nests along the proposed route. Any nests found would be mapped and flagged in the field, and construction routes and activities would be planned to avoid the nests. Tree removal would be restricted to the minimum number of trees necessary to allow access by construction vehicles.

Conducting pre-construction surveys of rock outcrops and other formations along the access route would provide a basis for mitigating impacts to pallid bat roosts, if any are present. Surveys would be conducted by a biologist with expertise in bat biology who would use visual survey techniques and acoustic monitoring equipment to determine whether pallid bats are likely to use any of these structures. If evidence of pallid bat use is discovered, roost sites would be mapped by GPS and flagged in the field. Construction would be routed to avoid roost sites.

Impacts to CRLFs, foothill yellow-legged frogs, western pond turtles, and two-striped garter snakes along the Carmel River would be mitigated by erosion Best Management Practices (BMPs) to protect the Carmel River channels (see Section 4.3 Water Quality) and the SWPPP in Appendix K).

These mitigation measures would reduce the impact to a less than significant, short-term impact.

Alternative 1 (Dam Notching)

The Project Area for Alternative 1 encompasses vegetation and other terrestrial biological resources along existing access roads requiring improvements, and at the Dam itself (including the fish ladder). In addition, this alternative encompasses the sediment disposal site, the conveyor route to the sediment disposal site, and those resources currently occupying the sediment that would be excavated. The abutment work described for the Proponent's Proposed Project would not be included, nor would improvements to Tularcitos Road, but improvements to the existing Jeep Trail extending from the Cachagua Road to the sediment disposal site and from the Jeep Trail to the reservoir would be required for this alternative as well as Alternatives 2 and 3.

The transport and disposal of 1.5 million cubic yards of sediment would result in the removal of numerous coast live oak trees (see Issue VE-1 Special-Status Plant Species above). Riparian species also would be impacted at the reservoir end of the conveyor route. Removal of mature trees of coast live oak or riparian species would be a significant, mitigable impact.

Types of potential impacts to terrestrial botanical resources from Alternative 1 are similar to those described for the Proponent's Proposed Project above, but would impact 41.8 acres (see Table 4.5-1). There would be additional impacts at the sediment disposal site and access route described below in Issues WI-9 through WI-12.

Wildlife Issues WI-1 (Dam Strengthening), WI-5 (Concrete Batch Plant), WI-6 (Tularcitos Access Road Improvements), WI-7 (Reservoir Drawdown without Sediment Removal) and WI-13 (Bypass Channel Excavation) would not occur under Alternative 1. Impacts and mitigation for Issues WI-3 (Cofferdam Construction and Plunge Pool Dewatering), and WI-4 (Notching Old Carmel River Dam) would be the same as the Proponent's Proposed Project.

Issue VE-1: Special-Status Plant Species

Effects on virgate eriastrum or Lewis's clarkia populations
*Determination: **less than significant with mitigation, short-term***

IMPACT

Populations of Lewis's clarkia were found along the existing access road from Cachagua Road and at the sediment disposal site. Improvements made to this road for construction access could result in additional impacts to this species. However, both virgate eriastrum and Lewis's clarkia are on List 4 of the CNPS Inventory, and do not fall under specific state or federal regulatory authority.

MITIGATION

To the extent possible, potential impacts from construction activities would be avoided by avoiding populations of CNPS List 4 species.

Issue VE-2: Loss of Protected Oak Woodland

Loss of oak woodlands
*Determination: **less than significant with mitigation, long-term***

IMPACT

Construction activities could result in loss of 20.1 acres of oak woodlands protected by the Monterey County Oak Protection Ordinance. Improvements to access routes may also result in oak losses. Most of the loss of oak woodland would occur at the sediment disposal site and the conveyor route to this site.

MITIGATION

The Proponent's Proposed Project Mitigation Measure VE-2 (Loss of Protected Oak Woodland) would be implemented. Mitigation would be more extensive than for the Proponent's Proposed Project because the amount of oak woodlands is greater for Alternative 1 as shown in Table 4.5-1.

Issue VE-3: Loss of Other Native Vegetation

Loss of native vegetation
*Determination: **less than significant with mitigation, long-term***

IMPACT

Project activities are expected to result in loss of native vegetation, including several types of sensitive riparian habitat and oak woodland habitat. This would be a significant, mitigable, impact.

The acreage of vegetation cover type that would be lost as a result of Alternative 1 is provided in Table 4.5-1. The total acreage of vegetation that would be lost is 41.8 acres. The impact characterization would be the same as described for Impact VE-3 (*Loss of Other Native Vegetation*) under the Proponent's Proposed Project but the quantum of impact would be greater. It would be a less than significant impact as described under Impact Issue VE-3 for the Proponent's Proposed Project.

MITIGATION

The Proponent's Proposed Project Mitigation Measure VE-3 (Loss of Other Native Vegetation) would be implemented. Mitigation would be more extensive than for the Proponent's Proposed Project because the amount of oak woodlands is greater for Alternative 1 as shown in Table 4.5-1.

Issue VE-4: Indirect Effects on Native Vegetation

Effects caused by increased erosion and sedimentation
*Determination: **less than significant with mitigation, short-term***

IMPACT

Project activities may result in indirect impacts to vegetation, including increased erosion and sedimentation, damage to roots of oaks and other tree species adjacent to areas where heavy equipment would be operated, dust impacts to roadside vegetation, and colonization of exposed substrate by exotic plant species. This would be a significant, mitigable impact.

MITIGATION

The Proponent's Proposed Project Mitigation Measure VE-4 (Indirect Effects on Native Vegetation) would be implemented.

Issue WI-2: Removal of Ancillary Facilities

Displacement of special-status bats
Determination: ***less than significant with mitigation, short-term***

IMPACT

Removing the valve house from atop SCD and removing other anthropogenic structures from near the Dam may displace special-status bat species from traditional roosts.

Unidentified species of bats use the valve house and other nearby buildings as day roosts. Removing those structures would displace roosting bats and may increase mortality if the structures are removed when newborn or very young bats are present in the roosting colonies. This could be a potentially significant short-term impact.

MITIGATION

Proponent's Proposed Project Mitigation Measure Issue WI-1 (Dam Strengthening) would be implemented. If possible, structure removal would be scheduled after juvenile bats are weaned and capable of flight, as determined by a biologist with expertise in bat biology. These mitigation measures would reduce the impact to a less than significant, short-term impact.

Issue WI-8: Vegetation Removal and Construction-Related Disturbance

Effects on Special-Status Bird Species and Others Protected by the Migratory Bird Treaty Act or Raptor Protections.
Determination: ***less than significant with mitigation, short-term***

IMPACT

Potential impacts to special-status birds from vegetation removal and other construction activities, including potential disturbance to breeding individuals during the nesting season, would be similar to those for the Proponent's Proposed Project, but a greater extent of vegetation and potential habitat for breeding birds would be affected.

MITIGATION

Proponent's Proposed Project Mitigation Measure WI-8 (*Vegetation Removal and Construction-Related Disturbance*) would be implemented.

Issue WI-9: Pre-Existing Access Road Improvements

Effects to special-status species
Determination: ***less than significant with mitigation, short-term***

IMPACT

Improvements to the existing Jeep Trail extending from the Cachagua Road to the sediment disposal site and the construction of the conveyor route from the Jeep Trail to the reservoir would be required for Alternative 1, 2 and 3. Widening and improving this road could potentially result in minor indirect impacts to Monterey dusky-footed wood rat and other special-status wildlife species using vegetation in the construction zone, including oak woodlands.

Potential impacts to special-status birds include potential disturbance to breeding individuals during the nesting season, particularly if nests occur in or adjacent to the construction sites. Impacts could include direct loss of eggs or nestlings; indirect displacement from increased noise and human presence in the vicinity of the construction activity; and a reduction in foraging habitat. Possible impacts to breeding birds will depend on a number of variables, including species affected, nest location, topographical shielding, and breeding phenology. The impact associated with construction would be only during CY 3.

MITIGATION

Tree removal would be restricted to the minimum number of trees necessary to allow access by construction vehicles.

Pre-construction surveys of the Jeep Trail would be conducted by qualified wildlife biologists, to assess the likely presence or habitat use by any special-status wildlife species. If listed species habitat or individuals could be harmed, Best Management Practices, included in the Protection Measures for Special Status Species Plan (Appendix V), would be developed to avoid or mitigate impacts to special-status wildlife species habitat or individuals.

Issue WI-10: Reservoir Drawdown or Elimination with Sediment Removal

Effects on California red-legged frog (CRLF) habitat
Determination: ***significant, unavoidable, short-term; long-term beneficial with mitigation***

IMPACT

Reservoir drawdown may strand CRLF tadpoles away from pool habitat and may also isolate transformed and adult CRLFs far enough from moisture sources to cause desiccation and death. As pools decline, CRLFs and tadpoles may also become increasingly vulnerable to predation and to inter- and intraspecific competition, as well as to weather extremes. The drawdown may also isolate western pond turtles and potentially impact juveniles by severely limiting available cover and forage. Adult western pond turtles can disperse safely independently of moisture and most weather conditions, but juveniles and hatchlings may be killed or injured during the drawdown.

This could be a potentially significant, short-term impact.

MITIGATION

A biologist permitted and approved by the USFWS to relocate California red-legged frogs and western pond turtles would monitor and oversee all terrestrial wildlife-related activities associated with the drawdown and subsequent activities in the reservoir bed.

As the drawdown commences and the reservoir water level declines, the USFWS-approved biologist and crew would rescue CRLFs and tadpoles and western pond turtle juveniles and hatchlings from the inlet streams and pools in the sediment bed, and relocate them to appropriate aquatic habitat at previously selected secure sites within one mile of San Clemente reservoir. The detailed relocation program for CRLFs is discussed under the mitigation measure for the Proponent's Proposed Project Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) and in the Protection Measures for Special Status Species (Appendix V). Other native wildlife taken incidentally during these operations would be transported to secure habitat (which may be the same sites selected for relocation of CRLFs and tadpoles and western pond turtle juveniles and hatchlings). This operation would continue throughout the reservoir drawdown, vegetation clearing, and sediment excavation operations (see Mitigation Measure WI-11 (Sediment Removal); hand vegetation clearing, as detailed in Mitigation Measure WI-11, would commence immediately after the drawdown begins).

While it is difficult to determine whether the loss of CRLFs and other species that are not rescued or that are injured or die during the rescue and relocation operations is significant, these losses along with the temporary loss of habitat for the red-legged frog cannot be fully mitigated and would be significant in the short-term. However, the CRLF Program, which is discussed in mitigation for Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) would restore additional sites as mitigation habitat for CRLFs and other species. This mitigation would improve habitat and provide a long-term, beneficial impact.

Issue WI-11: Sediment Removal

Destruction of spawning habitat
*Determination: **significant, unavoidable, short-term; long-term beneficial with mitigation***

IMPACT

Removing the sediment from San Clemente Reservoir to a level below the dam notch would adversely affect nearly all extant CRLF spawning and summer habitat within the reservoir. Spawning habitat would regenerate and become suitable in perhaps as little as a few months. Some loss would occur either during removal of CRLFs and tadpoles, Coast Range newt larvae, and western pond turtle juveniles and hatchlings from the sediment bed before commencing vegetation removal or sediment excavation, or if individuals are missed in the rescue operation. These impacts are potentially significant short-term impacts.

MITIGATION

Mitigation Measure WI-3 (Cofferdam Construction and Plunge Pool Dewatering) would be implemented. The monitoring biologist and crew would capture and relocate all CRLFs. Prior to any sediment excavation and before CRLFs have been cleared completely from the reservoir bed, vegetation on the sediment bed would be removed with chainsaws and other handheld cutting devices (except "weedwhackers"). Vegetation removed with hand tools would be limited to no lower than 12 inches above grade, to protect CRLFs. Cleared vegetation would be removed from the reservoir bed immediately, and taken to an off-site location. After hand clearing is completed, the monitoring biologist would resurvey the reservoir bed to determine if any CRLFs or tadpoles remain within the reservoir sediment bed. After ten days pass in which no further CRLFs or tadpoles, Coast Range newt larvae, or western pond turtle juveniles or hatchlings are found in aquatic habitat in the reservoir bed, machine operations including mechanical vegetation removal and sediment excavation would be allowed to commence in the reservoir bed. Grubbing and mechanical stump removal would be performed only after hand clearance is completed and after the monitoring biologist has confirmed that the reservoir sediment bed is free of CRLFs and tadpoles.

After all vegetation is removed, the monitoring biologist would re-survey the reservoir sediment bed a final time to ascertain that CRLF, Coast Range newt larvae, and western pond turtle juveniles and hatchlings are absent from the site. Sediment excavation to the desired level, including all removal, grading and reshaping of the sediment bed, would then commence. If sediment excavation is not accomplished within one season, these procedures would be repeated at the initiation of each construction season to relocate sensitive species that may have re-colonized the reservoir bed.

While it is difficult to determine whether the loss of CRLFs and other species that are not rescued or that are injured or die during the rescue and relocation operations is significant, these losses along with the temporary loss of habitat for the red-legged frog cannot be fully mitigated and would be significant in the short-term. However, the CRLF Program, which is discussed in mitigation for Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) would restore additional sites as mitigation habitat for CRLFs and other species. This mitigation would improve habitat and provide a long-term beneficial impact.

Issue WI-12: Sediment Transport and Disposal

Adverse effects to special-status species
*Determination: **less than significant with mitigation, long-term***

IMPACT

The proposed sediment disposal site (4R) may include habitat for some of the special-status wildlife species discussed above. Deposition of large volumes of sediment at this site could destroy habitat and may also injure or kill special-status wildlife species. Species most likely to be affected include coast horned lizard, Monterey dusky footed wood rat, and perhaps California tiger salamander or Coast Range newt. Installation and operation of the conveyor system from the Carmel River canyon to Site 4R may result in substantial habitat loss for special-status wildlife species, including oak woodland. Because these sites include oak woodland, this is a potentially significant long-term impact.

MITIGATION

The mitigation would be the same as WI-9 (Pre-Existing Access Road Improvements)

These mitigation measures would reduce the impact to a less than significant, short-term impact.

Alternative 2 (Dam Removal)

The Project Area for Alternative 2 encompasses vegetation and other terrestrial biological resources along the existing San Clemente Road, along existing access roads requiring minor improvements, at the Dam itself, at the sediment disposal site, along the conveyor route to the sediment disposal site, and those resources currently occupying the sediment that would be excavated. The acreage of vegetation by cover type that would be lost as a result of Alternative 2 is provided in Table 4.5-1. The total acreage of vegetation that would be lost is 61.4 acres. The abutment work and fish ladder described for the Proponent's Proposed Project would not be included, as the Dam and the fish ladder would be removed, but improvements to the existing Jeep Trail extending from the Cachagua Road to the sediment disposal site would be required for this alternative, as well as Alternatives 1 and 3.

Mitigation measures for Issues VE-1 (Special-Status Plant Species), VE-2 (Loss of Protected Oak Woodland), VE-3 (Loss of Other Native Vegetation), VE-4 (Indirect Effects on Native Vegetation) would be the same as the Proponent's Proposed Project; however, the mitigation required for Alternative 2 under VE-2 is greater than the mitigation required for the Proponent's Proposed Project because the acreage of vegetation affected would be greater.

Impacts and mitigation for issues WI-3 (Cofferdam Construction and Plunge Pool Dewatering), and WI-4 (Notching Old Carmel River Dam) would be the same as the Proponent's Proposed Project. Mitigation for Issue WI-8 (Vegetation Removal and Construction-Related Disturbance) would be the same as the Proponent's Proposed Project.

Impacts and mitigation for Issues WI-2 (Removal of Ancillary Facilities), WI-9 (Pre-Existing Access Road Improvements), WI-11 (Sediment Removal), and WI-12 (Sediment Transport and Disposal) would be the same as described for Alternative 1. Mitigation for Issue WI-10 (Reservoir Drawdown or Elimination with Sediment Removal, would be the same as described for Alternative 1.

Wildlife Issues WI-1 (Dam Strengthening), WI-5 (Concrete Batch Plant Construction and Operation), WI-6 (Tularcitos Access Road Improvements); WI-7 (Reservoir Drawdown Without Sediment Removal), and WI-13 (Bypass Channel Excavation) would not occur under Alternative 2.

Issue VE-1: Special-Status Plant Species

Effects on virgate eriastrum or Lewis's clarkia populations
Determination: ***less than significant, less than significant with mitigation, short-term***

IMPACT

Populations of Lewis's clarkia were found along the existing access road from Cachagua Road and at the sediment disposal site. Improvements made to this road for construction access could result in additional impacts to this species. However, Lewis's clarkia is on List 4 of the CNPS Inventory, and does not fall under specific state or federal regulatory authority.

MITIGATION

Mitigation for impacts resulting from Issue VE-1 would be the same as the Proponent's Proposed Project.

Issue VE-2: Loss of Protected Oak Woodland

Loss of oak woodlands
Determination: ***less than significant with mitigation, long-term***

IMPACT

Construction activities could result in loss of 26.3 acres of oak woodlands protected by the Monterey County Oak Protection Ordinance in the area mapped in 2005. Improvements to access routes may also result in oak losses. Most of the loss of oak woodland would occur at the sediment disposal site and the conveyor route to this site.

MITIGATION

Mitigation measures for impacts resulting from Issue VE-2 would be the same as the Proponent's Proposed Project, but would be more extensive because the total impacted acreage would be greater.

Issue VE-3: Loss of Other Native Vegetation

Loss of native vegetation
Determination: ***less than significant with mitigation, long-term***

IMPACT

Project activities are expected to result in loss of native vegetation, including several types of sensitive riparian habitat and oak woodland habitat.

The acreage of vegetation cover type that would be lost as a result of Alternative 2 implementation is provided in Table 4.5-1. The total acreage of vegetation that would be lost in the area mapped in 2005 is 61.4 acres. The impact characterization would be the same as described for Impact VE-3 (*Loss of Other Native Vegetation*) under the Proponent's Proposed Project. It would be a less than significant impact.

MITIGATION

Mitigation measures for impacts resulting from Issue VE-3 would be the same as the Proponent's Proposed Project, but would be more extensive because the total impacted acreage would be greater.

Issue VE-4: Indirect Effects on Native Vegetation

Effects caused by increased erosion and sedimentation
Determination: ***less than significant with mitigation, short-term***

IMPACT

Project activities may result in indirect adverse impacts to vegetation, including increased erosion and sedimentation, damage to roots of oaks and other tree species adjacent to areas where heavy equipment would be operated, dust impacts to roadside vegetation, and colonization of exposed substrate by exotic plant species. This would be a significant, mitigable impact.

MITIGATION

Mitigation for impacts resulting from Issue VE-4 would be the same as the Proponent's Proposed Project.

Issue WI-8: Vegetation Removal and Construction-Related Disturbance

Effects on Special-Status Bird Species and Others Protected by the Migratory Bird Treaty Act or Raptor Protections.
Determination: ***less than significant with mitigation, short-term***

IMPACT

Potential impacts to special-status birds from vegetation removal and other construction activities include potential disturbance to breeding individuals during the nesting season would be similar to those for the Proponent's Proposed Project and Alternative 1, but a greater extent of vegetation and potential habitat for breeding birds would be affected during the construction phase.

MITIGATION

Proponent's Proposed Project Mitigation Measure WI-8 (*Vegetation Removal and Construction-Related Disturbance*) would be implemented.

Alternative 3 (Carmel River Reroute and Dam Removal)

Mitigation measures for Vegetation and Wildlife issues VE-1 (Special-Status Plant Species), VE-2 (Loss of Protected Oak Woodland), VE-3 (Loss of Other Native Vegetation), and VE-4 (Indirect Effects on Native Vegetation) would be the same as the Proponent's Proposed Project. However, fewer acres of oak woodland would be impacted.

Impacts and mitigation for WI-3 (Cofferdam Construction and Plunge Pool Dewatering), and WI-4 (Notching Old Carmel River Dam) would be the same as the Proponent's Proposed Project.

Wildlife Issues WI-1 (Dam Strengthening), WI-5 (Concrete Batch Plant Construction and Operation), WI-6 (Tularcitos Access Road Improvements), WI-7 (Reservoir Drawdown or Elimination), and WI-12 (Sediment Transport and Disposal) would not occur under Alternative 3. Impacts and mitigation for WI-2 (Removal of Ancillary Facilities), WI-9 (Pre-Existing Access Road Improvements) except for any impacts caused by road improvements from the Jeep Trail to the sediment disposal site, WI-10, (Reservoir Drawdown or Elimination with Sediment Removal), and WI-11 (Sediment Removal) would be the same as described for Alternative 1.

The Project Area for Alternative 3 encompasses vegetation and other terrestrial biological resources along the existing San Clemente Road, along existing access roads requiring minor improvements, at the Dam itself, along the Cachagua Access Route to the reservoir, and those resources currently occupying the area of the bypass channel and the diversion dike, as well as the areas that would be excavated or dewatered. The abutment work and fish ladder described for the Proponent's Proposed Project would not be included, because the Dam and the fish ladder would be removed, but improvements to extend access from the Cachagua Road to the reservoir would be required for this alternative, as well as Alternatives 1 and 2.

Potential impacts to terrestrial botanical resources from Alternative 3 are similar to those described for the Proponent's Proposed Project, with the additional loss of vegetation at the diversion channel site. However, substantially less coast live oak woodland would be affected than Alternative 1 or 2, because neither the new Tularcitos Access Route nor the sediment disposal site would be included in Alternative 3.

Impact VE-1: Special-Status Plant Species

Effects on virgate eriastrum population
*Determination: **less than significant with mitigation, short-term***

IMPACT

Populations of Lewis's clarkia were found along the existing access road from Cachagua Road and at the sediment disposal site. Improvements made to this road for construction access could result in additional impacts to this species. However, Lewis's clarkia is on List 4 of the CNPS Inventory, and does not fall under specific state or federal regulatory authority.

MITIGATION

Mitigation for impacts resulting from Issue VE-1 would be the same as the Proponent's Proposed Project.

Issue VE-2: Loss of Protected Oak Woodland

Loss of oak woodlands

*Determination: **less than significant with mitigation, long-term***

IMPACT

Construction activities could result in loss of 9.6 acres of oak woodlands protected by the Monterey County Oak Protection Ordinance. Improvements to other access routes may also result in oak losses. Most of the loss of oak woodland would occur at the new access route from the Jeep Trail to the construction site.

MITIGATION

Mitigation for impacts resulting from Issue VE-2 would be the same as the Proponent's Proposed Project, but would be more extensive because the total acreage would be greater.

Issue VE-3: Loss of Other Native Vegetation

Loss of native vegetation
*Determination: **less than significant with mitigation, long-term***

IMPACT

Project activities are expected to result in loss of native vegetation, including several types of sensitive riparian habitat and oak woodland habitat. This would be a significant, mitigable impact.

The acreage of vegetation cover type that would be lost as a result of Project implementation is provided in Table 4.5-1. The total acreage of vegetation that would be lost is 44.7 acres. The impact characterization would be the same as described for Impact VE-3 (*Loss of Other Native Vegetation*) under the Proponent's Proposed Project. It would be a less than significant impact.

MITIGATION

Mitigation for impacts resulting from Issue VE-3 would be the same as the Proponent's Proposed Project, but would be more extensive because the total acreage would be greater.

Issue VE-4: Indirect Effects on Native Vegetation

Effects caused by increased erosion and sedimentation
*Determination: **less than significant with mitigation, short-term***

IMPACT

Project activities may result in indirect adverse impacts to vegetation, including increased erosion and sedimentation, of oaks and other tree species adjacent to areas where heavy equipment would be operated, dust impacts to roadside vegetation, and colonization of exposed substrate by exotic plant species.

MITIGATION

Mitigation measures for impacts resulting from Issue VE-4 would be the same as the Proponent's Proposed Project.

Issue WI-8: Vegetation Removal and Construction-Related Disturbance

Effects on special-status bird species and others protected by the Migratory Bird Treaty Act or Raptor Protections.
*Determination: **less than significant with mitigation, short-term***

IMPACT

Potential impacts to special-status birds from vegetation removal and other construction activities include potential disturbance to breeding individuals during the nesting season would be similar to those for Alternative 1, but less oak woodland would be affected. These disturbances to habitat would be less than those for Alternative 2.

MITIGATION

Proponent's Proposed Project Mitigation Measure WI-8 (*Vegetation Removal and Construction-Related Disturbance*) would be implemented.

Issue WI-13: Bypass Channel Excavation

Loss of habitat for special-status species
*Determination: **significant, unavoidable, long-term***

IMPACT

Brushland and riparian habitat clearing and channel excavation would remove some habitat for aquatic species including the CRLF, Coast Range newt and the western pond turtle. In addition, these activities may also affect other special-status terrestrial wildlife species, particularly the Monterey dusky-footed wood rat.

This alternative would reduce the amount of lucustrine habitat in the Project Area which may reduce the amount of bullfrog habitat which, in turn, may benefit the CRLF population.

MITIGATION

A CRLF adult and tadpole and western pond turtle juvenile and hatchling relocation program would be conducted to clear the sediment bed of these species prior to vegetation removal, sediment redistribution, channel excavation, and roadway construction. Presence of terrestrial special-status species would be assessed by preconstruction surveys and flagging of special-status species habitat for avoidance. The details of the CRLF relocation program and habitat enhancement are discussed in the mitigation measures for the Proponent's Proposed Project Issue WI-3 (Cofferdam Construction and Plunge Pool Dewatering) and in the Protection Measures (Appendix V).

Individuals of listed species not discovered during the rescue and relocation effort could be desiccated. More details are provided in the Protection Measures for Special-status Species (Appendix V).

Alternative 4 (No Project)

No improvements would be made to the roads and the Dam would remain in its current condition. There would be no construction impacts associated with this alternative.

Under this alternative, the reservoir would eventually reach a point where sediment is no longer captured by the Dam. Resulting changes in sediment effects would be most prominent in the reservoir and in the reaches immediately downstream of the SCD.

4.6 WETLANDS

This section describes the potential impacts of the San Clemente Seismic Safety Project on the wetland resources of the Project Area. Wetland resources include all wetland vegetation, non jurisdictional areas with wetland vegetation and Other Waters of the U.S. influenced by the project. Riparian vegetation is discussed in Section 4.5. Additional information is provided in this Final EIR/EIS which clarifies and amplifies the information included in this EIR/EIS. This environmental setting section was prepared using information developed from the documents provided by the Recirculated Draft Environmental Impact Report (Denise Duffy & Associates 2000), which in turn was originally developed for the New San Clemente Project (MPWMD 1984). Wetlands delineations for the Proponent's Proposed Project were conducted by Wetland Research Associates, Inc. in 1994 and Olberding and Associates in 1998 (Denise Duffy & Associates 2000). ENTRIX scientists re-delineated the wetlands in July and August 2005 and February 2006 for the Proponent's Proposed Project and the alternatives under consideration. This Final EIR/EIS contains the 2005 wetland delineation report in Appendix W.

2030 Baseline Conditions

As described in Section 4.2, the natural sediment transport into the reservoir is estimated to average 16.5 AF/year (MEI 2003). At this rate, the reservoir would reach capacity in approximately 6 to 10 years and begin to pass this sediment load downstream.

In the San Clemente Reservoir sediment plain (Reach 3), a gentle incision of the meandering planform into the coarse sands would allow for the development of young riparian communities. Much of the San Clemente arm and the much larger Carmel River arm of the sediment plain already have fairly extensive areas of localized riparian vegetation, including sedge meadow, isolated seasonal and perennial ponds, and emergent riparian wetland vegetation. Larger floods, such as the 1998 flood, would continue to scour large portions of the young riparian growth, maintaining a dynamic sediment plain. However, as deposition of coarse sediment and large woody debris helps to stabilize the terraces and channel patterns develop into more incised meanders, an increased number of large patches of more mature riparian woodland and forest habitat would develop (Denise Duffy & Associates 2000).

Reach 4 (downstream of SCD) has hard banks and the upper portion of Reach 5 has relatively hard banks and moderate gradients that could experience sediment accumulation on bars, benches, and low overflow channels as the reservoir fills and begins to pass sediment downstream. Figure 4.6-1 included in this report identifies the River Reaches that would be affected by the Proponent's Proposed Project and its alternatives. These lower fluvial landforms are supporting different but relatively even-aged stands of riparian vegetation. These vary from small complexes of cottonwood-sycamore-willow-alder on the older deposits, to even-aged stands of alder and willow, to young herbaceous growth on the youngest bars.

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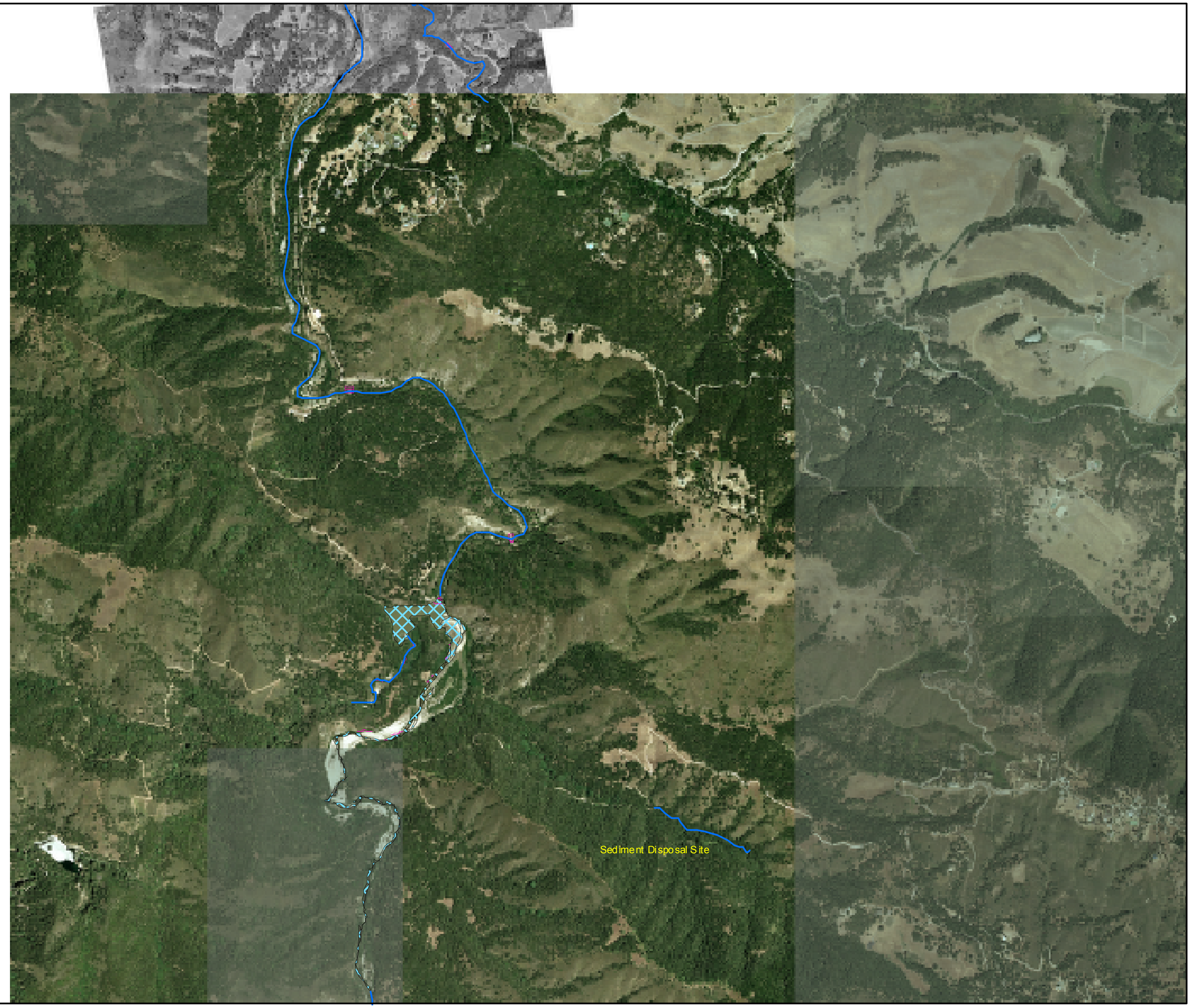

Legend

- Stream
- Wetland Delineation Sites
- Reservoir and Carmel River

Projection: NAD83
Datum: Lambert Conformal Conical

N

0 0.25 0.5 1 1.5 2 Miles

Figure 4.6-1
Wetlands and Other Waters of the U.S. in the Project Area

ENTRIX

Large episodic floods and deposits of sand could scour, bury, and kill recently-established riparian and brushy habitats near water. Since these reaches have hard banks and a steeper gradient, they are less subject to bank failure and loss of mature riparian vegetation, even in smaller episodic events (Denise Duffy & Associates 2000).

Softer banks occur in the lower portion of Reach 5 in the Robles del Rio area and increasingly downstream through reaches 6 and 7 and the upper portion of Reach 8. In areas with softer banks, the river channel would become wider and shallower. Deposition and low flow channel migration is likely to smother or remove young herbaceous and riparian scrub communities on the less stable bars, benches and terraces (Denise Duffy & Associates 2000).

Extensive areas of bare sandy flood plain and braided channels would be created when episodic events deposit large to very large amounts of material, especially if they occur early in the 50-year project life. A complex depositional and erosional pattern with blowouts, terrace scour holes, and trapping of large woody debris could lead to a complex of riparian and wetland habitats of different ages (Denise Duffy & Associates 2000).

Reach 8 (especially the lower two thirds) and the upper portion of Reach 9 have finer grained alluvial soils, with more extensive riparian forest and root stabilized banks. These conditions are combined in numerous locations with hardened banks and a relatively straight and narrow river channel with good conveyance. Therefore, there is less likely to be significant bank migration and loss of riparian vegetation in this reach. Substantial filling of the active channel would bury or create habitat favorable for growth of a successional complex of riparian habitats. This reach has only very localized opportunities for creation of smaller, more isolated and discontinuous bars and benches for seral herbaceous, shrub, willow scrub and woodland succession (Denise Duffy & Associates 2000).

The complex of riparian, wetland, and coastal dune habitats associated with the lagoon and the associated riparian forest above the lagoon is not expected to change appreciably due to release of sediment over SCD. The dynamics of this area are controlled by other factors (Denise Duffy & Associates 2000).

4.6.1 ENVIRONMENTAL SETTING

Locations with potential jurisdictional wetlands and Other Waters of the U.S. in the Project Area for the Proponent's Proposed Project and alternatives include Tularcitos Creek at the new Tularcitos Access Road crossing, the concrete ford on an existing access road, the Old Carmel Dam Bridge (OCDB), the existing plunge pool access road along the east side of the Carmel River (which requires improvements), the plunge pool at the SCD, and the reservoir flood plain upstream of the SCD.

Olberding and Associates conducted a separate field survey of the CVFP settling basins in 1997 (Denise Duffy & Associates 2000). The USACE concurred with this study in determining that the settling basins are not considered to be jurisdictional wetlands or Waters of the U.S. because they are artificial settling basins constructed on dry land for the purpose of collection and detention of piped sediment-laden water from the CVFP (Denise Duffy & Associates 2000). CVFP activities are ongoing, the source of hydrology in the settling basins is artificial and, under normal circumstances, wetland vegetation would not be present.

Wetlands in the Project Area for the Proponent's Proposed Project and alternatives consist primarily of riparian vegetation associated with the Carmel River, Tularcitos Creek, and the flood plain of the reservoir along the Carmel River and San Clemente Creek. This riparian vegetation would be classified as palustrine forested wetlands in the Cowardin system where the trees are taller than 20 feet, or as palustrine or lacustrine shrub-scrub wetlands where the woody vegetation is less than 20 feet tall (Cowardin 1979). Functions provided by these riparian wetlands include temporary surface water storage, energy dissipation, nutrient cycling, removal of non-point source pollutants, retention of particulates, organic carbon export, and maintenance of plant and animal communities (Brinson et al. 1995).

Where only herbaceous vegetation is present, the Cowardin classification would be palustrine emergent wetlands ranging from permanently flooded to seasonally flooded. Functions provided by these riparian wetlands include temporary surface water storage, energy dissipation, nutrient cycling, removal of non-point source pollutants, retention of particulates, organic carbon export, and maintenance of plant and animal communities (Brinson et al. 1995).

Other Waters of the U.S. in the Project Area include these streams, and the lower reservoir shoreline of San Clemente Reservoir.

Within the SCD study area, potential jurisdictional wetlands, under current conditions, are found adjacent to San Clemente Reservoir and the base of the SCD, the Carmel River, and Tularcitos Creek, as shown on Figure 4.6-1.

ENTRIX has made a preliminary determination that approximately 0.9 acres of jurisdictional wetlands are present at these sites with another 18.5 acres meeting the definition of "Other Waters of the U.S." under Section 404 of the Clean Water Act (CWA). The majority of this acreage occurs within the San Clemente Reservoir. This acreage does not include the fringe wetlands between the Carmel River and the access road, as the improvements to the road are not expected to affect these wetlands. These wetlands are generally in good condition.

4.6.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

The significance criteria for evaluating wetlands impacts resulting from the Proponent's Proposed Project are based on the following considerations. In accordance with CEQA Mandatory Findings of Significance, and agency and professional standards, an adverse impact on wetlands would be significant and would require mitigation if project construction or operations activities would:

- Fill or alter a wetland or vernal pool, resulting in a long-term change in its hydrology or soils, or the composition of vegetation of a unique, rare, or special concern wetland community;
- Substantially affect a rare or endangered species of animal or plant or the habitat of the species;
- Remove or significantly prune overstory tree species in a manner that would affect wetland functions related to bank stabilization, stream temperature, or insect habitat;
- Cause short- or long-term violations of federal or state water quality standards for streams that lead to wetlands, measured as in-stream elevated turbidity readings or decreased DO levels; or
- Cause substantial flooding, erosion or siltation

Impact Assessment Methodology

This assessment evaluates and identifies impacts over a range of temporal scales. The three temporal impact categories are:

- Short-term impacts that occur within the construction period, but do last throughout the period;
- Short-term impacts that occur within the construction period (concurrent with the number of construction seasons, which vary from one alternative to another);
- Long-term impacts that persist beyond the construction period.

Existing resource information and the results of new field studies in 2005 were used to develop the description of the environmental setting. The resources described in that section were evaluated in conjunction with the activities associated with the Proponent's Proposed Project and the alternatives to determine potential impacts and develop mitigation measures.

The following impact issues have been defined for Wetland resources:

- WET-1: Permanent Loss of Wetlands and Other Waters of the U.S. (permanent loss of jurisdictional waters of the U.S.)
- WET-2: Short-term Disturbance of Wetlands and Other Waters of the U.S. (short-term filling of fringe wetlands)
- WET-3: Indirect Impacts to Wetlands and Other Waters of the U.S. (indirect adverse impacts to vegetation, including increased erosion and sedimentation).

The acreages presented in the following discussion are estimates derived from preliminary engineering drawings (Table 4.6-1).

Table 4.6-1: Area of Waters of the U.S. and Potential Jurisdictional Wetlands Impacted by Proponent's Proposed Project and Alternatives

	Other Waters of the U.S. (acres)	Potential Jurisdictional Wetlands (acres)	Other Waters of the U.S. (acres)	Potential Jurisdictional Wetlands (acres)
	Permanent		Short-term	
Proponent's Proposed Project	0.02	--	7.3	0.43
Alternative 1	0.12	--	7.9	0.74
Alternative 2	0.12	--	11.5	0.92
Alternative 3	10.0	--	0.5	0.28
Alternative 4	No direct impacts			

4.6.3 IMPACTS AND MITIGATION

Proponent's Proposed Project (Dam Thickening)

Locations with potential jurisdictional wetlands in the Project Area for the Proponent's Proposed Project include the concrete ford on an existing access road, the OCDB, the existing access road along the east side of the Carmel River (which requires improvements), the plunge pool at SCD, and the reservoir flood plain upstream of the SCD. The majority of this acreage occurs within the San Clemente Reservoir.

Issue WET-1: Permanent Loss of Wetlands and Other Waters of the U.S.

Permanent loss of jurisdictional waters of the U.S.
Determination: ***less than significant with mitigation, long-term***

IMPACT

Construction activities associated with the Proponent's Proposed Project would result in the thickening of the Dam by nine feet at the plunge pool and the permanent loss of a small area of jurisdictional Other Waters of the U.S. (Table 4.6-1). Improvements to the

OCRD Bridge and concrete ford would result in no permanent loss of wetlands or Other Waters of the U.S.

MITIGATION

See Appendix U for a Botanical Management Plan which includes provisions for restoration, mitigation, and monitoring for wetlands and Other Waters affected by the project. Riparian and fringe palustrine emergent wetlands similar in function (streamside habitat) to the lost acreage would be created or restored at a 3:1 ratio, grading as necessary and placing cuttings or seedlings in appropriate habitat under the supervision of a qualified botanist. Seedlings would be from Carmel Valley area populations. Replacement plantings would be monitored for at least five years. Seedlings would be replanted as necessary to ensure long-term survival. Restoration sites would be monitored for five years. The USACE, and CDFG would have regulatory authority over the measures in the Botanical Management Plan, but performance criteria will include cover criteria for native vegetation (ranging from 50 to 75 percent) and survival criteria for woody vegetation that is planted. Additional mitigations details are provided in the Botanical Resources Management Plan (Appendix U).

For impacts to Other Waters, mitigation may consist of stream channel improvements either along the Carmel River upstream from the Project Area or along other streams in the watershed. The project proponent may either conduct the work or provide funding to other property managers for projects that restore natural channel conditions.

Restoration may be conducted at sites in lands along the Carmel River owned by the Project Proponent or on appropriate streams elsewhere in the watershed. Restoration sites would be coordinated with the USACE and CDFG and would be conserved in perpetuity.

Issue WET-2: Short-term Disturbance of Wetlands and Other Waters of the U.S.

Short-term filling of fringe wetlands
Determination: ***Less than significant with mitigation, short-term***

IMPACT

Construction activities associated with the Proponent's Proposed Project would result in the temporary filling or dewatering of a small area of fringe palustrine emergent wetlands and several acres of Other Waters of the U.S. (Table 4.6-1).

Construction activities associated with the Proponent's Proposed Project would have no effect on wetlands above the Dam and minimal temporal effect on Other Waters of the U.S. due to draining the reservoir pool and temporary placement of a cofferdam and diversion pipeline during Phase II. Below the Dam, temporary fill would be placed in the plunge pool and at the upper end of the plunge pool access road. Two temporary cofferdams would also be placed in the Carmel River to prevent back flow and create a stilling basin between the cofferdams.

Improvements to the Old Carmel River Dam Bridge and concrete ford should result in no permanent loss of wetlands or Other Waters of the U.S. The Old Carmel River Dam Bridge can be reached from the south end without affecting fringe wetlands. Temporary caissons would constitute a minor temporary fill, and the new upstream piers would occupy approximately the same footprint as the existing piers. The concrete ford for the "high road" would probably require minor fill on top of existing soft fill on the south side of the crossing to provide a firm base.

MITIGATION

Mitigation for Impact Issue WET-1 (Permanent Loss of Wetlands and Other Waters of the U.S.*)* would be implemented. In addition, cofferdams would be constructed of clean river-run gravel. They would be installed no earlier than May and removed in October. (If existing flows are less than the 50 cfs bypass capacity, the cofferdams could be installed as early as April 15th or removed as late as November 30th).

The plunge pool staging area would be filled with gravel (spawning size) and topped with a visqueen liner and a layer of crushed rock and/or sand to create a working surface. When construction is complete, the surface layer and liner would be removed off-site and the gravels used to augment spawning habitat in the plunge pool tailwater and downstream.

The plunge pool access road would be upgraded to a one lane, two-way road with pullouts to minimize road widening and loss of wetlands and riparian vegetation. Any willows, alders, cottonwoods or sycamores removed by temporary filling of the plunge pool and access road would be replaced at a 3:1 ratio by placing cuttings or seedlings in appropriate habitat under the supervision of a qualified botanist. Seedlings would be from Carmel Valley area populations. Replacement plantings would be monitored for at least five years. Seedlings would be replanted as necessary to ensure long-term survival (see mitigation for Impact Issue VE-3 (Loss of other Native Vegetation) in Section 4.5). Additional mitigation details are located in the Botanical Resources Management Plan (Appendix U)

Issue WET-3: Indirect Impacts to Wetlands and Other Waters of the U.S.

Indirect adverse impacts to vegetation, including increased erosion and sedimentation
*Determination****: less than significant with mitigation, short-term***

IMPACT

Construction activities associated with the Proponent's Proposed Project could have indirect impacts on wetlands and Other Waters of the U.S. if these activities result in accelerated erosion and sedimentation. Potential erosion and sedimentation impacts are described in detail in Section 4.5, (Impact Issue VE-4, Indirect Effects on Native Vegetation) Proponent's Proposed Project.

MITIGATION

Implementing mitigation measures for Impact Issue VE-4 would reduce Impact Issue WET-3 to less than significant. BMPs for erosion control are located in the Stormwater Pollutions and Prevention Plan and the Botanical Resources Management Plan (Appendices K and U, respectively).

Alternative 1 (Dam Notching)

Locations with potential jurisdictional wetlands in the Project Area for Alternative 1 include the concrete ford on an existing access road, the OCDB, the existing access road along the east side of the Carmel River (which requires improvements), the plunge pool at SCD, the reservoir flood plain upstream of SCD, and the sediment disposal site. ENTRIX has made a preliminary determination that approximately 0.7 acre of wetlands are present at these sites with another 8.0 acres meeting the definition of "Other Waters of the U.S." under Section 404 of the CWA. The majority of this acreage occurs within the San Clemente Reservoir.

Impact Issue WET-3 (Indirect Impacts to Wetlands and Other Waters of the U.S.) would be the same as described for the Proponent's Proposed Project.

Issue WET-1: Permanent Loss of Wetlands and Other Waters of the U.S.

Permanent loss of Other Waters of the U.S.
Determination: ***less than significant with mitigation, long-term***

IMPACT

Potential impacts to wetland resources from Alternative 1 are similar to those described for the Proponent's Proposed Project WET-1 (Permanent Loss of Wetlands and Other Waters of the U.S.*),* except that construction activities associated with this alternative would result in the permanent loss of Other Waters of the U.S. due to fill at the sediment disposal site (Table 4.6-1).

MITIGATION

Mitigation measures for Impact Issue WET-1 would be the same as described for the Proponent's Proposed Project. The restoration or conservation acreages would be adjusted to suit the affected acreage.

Issue WET-2: Short-term Disturbance of Wetlands and Other Waters of the U.S.

Short-term loss of fringe wetlands and Other Waters of the U.S.
Determination: ***Less than significant with mitigation, short-term***

IMPACT

Potential impacts to wetland resources from Alternative 1 are similar to those for the Proponent's Proposed Project WET-2 (Short-term Disturbance of Wetlands and Other Waters of the U.S.), except that construction activities associated with this alternative would result in the temporary loss of fringe wetlands and Other Waters of the U.S. (Table 4.6-1).

Construction activities associated with Alternative 1 would affect wetlands and Other Waters of the U.S. above the Dam due to sediment removal. Below the Dam, temporary fill would be placed in the plunge pool and at the upper end of the plunge pool access road, affecting limited areas of Other Waters of the U.S. and fringe wetlands. A temporary cofferdam would also be placed in the Carmel River to divert the flow into a pipeline. A similar cofferdam may be placed in San Clemente Creek.

MITIGATION

Mitigation Measures WET-1 and WET-2 would be implemented as described for the Proponent's Proposed Project. The restoration or conservation acreages would be adjusted to suit the affected acreage.

Issue WET-3: Indirect Impacts to Wetlands and *Other* Waters of the U.S.

Indirect adverse impacts to vegetation, including increased erosion and sedimentation
Determination: ***less than significant with mitigation, short-term***

IMPACT

Construction activities associated with Alternative 1 could have indirect impacts on wetlands and Other Waters of the U.S. if these activities result in accelerated erosion and sedimentation. Potential erosion and sedimentation impacts are described in detail in Section 4.5, (Issue VE-4, Indirect Effects on Native Vegetation) Proponent's Proposed Project.

MITIGATION

Implementing mitigation measures applying to Impact Issue VE-4 would reduce Impact WET-3 to less than significant.

Alternative 2 (Dam Removal)

Within the Project Area of Alternative 2, potential jurisdictional wetlands, under current conditions, are found adjacent to San Clemente Reservoir and the base of the SCD (including the plunge pool), and the Carmel River as shown on Figure 4.6-1. Potential Other Waters of the U.S. include these streams, an unnamed tributary to the Carmel River that forms part of the sediment disposal site, and the reservoir pool upstream of the SCD. The majority of this acreage occurs within the San Clemente Reservoir.

Issue WET-1: Permanent Loss of Wetlands and Other Waters of the U.S.

Permanent loss of Other Waters of the U.S.
Determination: ***less than significant with mitigation, long-term***

IMPACT

Potential impacts to wetland resources from Alternative 2 are similar to those described for the Proponent's Proposed Project WET-1 (Permanent Loss of Wetlands and Other Waters of the U.S.), except that construction activities associated with this alternative would result in the permanent loss of Other Waters of the U.S. due to fill at the sediment disposal site (Table 4.6-1).

MITIGATION

Mitigation measures applying to Impact Issue for the Proponent's Proposed Project would be implemented. The restoration or conservation acreages would be adjusted to suit the affected acreage.

Issue WET-2: Short-term Disturbance of Wetlands and Other Waters of the U.S.

Short-term filling of fringe wetlands
Determination: ***Less than significant with mitigation, short-term***

IMPACT

Potential impacts to wetland resources from Alternative 2 are similar to those described for Alternative 1, but include short-term impacts to additional wetlands and Other Waters of the U.S. upstream of the disturbance limits of Alternative 1 (Table 4.6-1).

MITIGATION

Mitigation measures applying to Impact Issues WET-1 (Permanent Loss of Wetlands and Other Waters of the U.S.) and WET-2 under the Proponent's Proposed Project would be implemented. The restoration or conservation acreages would be adjusted to suit the affected acreage.

Issue WET-3: Indirect Impacts to Wetlands and Other Waters of the U.S.

Indirect adverse impacts to vegetation, including increased erosion and sedimentation
Determination: ***less than significant with mitigation, short-term***

IMPACT

Potential impacts to wetland resources from Alternative 2 are similar to those described for the Proponent's Proposed Project, but include impacts to Other Waters in the unnamed tributary that is part of the sediment disposal site.

MITIGATION

Implementing mitigation measures applying to Impact Issue VE-4 would reduce Impact WET-3 to less than significant.

Alternative 3 (Carmel River Reroute and Dam Removal)

Locations with potential jurisdictional wetlands and Other Waters of the U.S. in the Project Area for Alternative 3 include the concrete ford on an existing access road, the OCDB, the existing access road along the east side of the Carmel River (which requires improvements), the reservoir flood plain upstream of SCD and access route and the conveyor route for the sediment disposal site (which form the primary access route for this alternative).

Within the Alternative 3 Project Area, potential jurisdictional wetlands, under current conditions, are found adjacent to San Clemente Reservoir and the base of the SCD, the Carmel River, and San Clemente Creek, as shown on Figure 4.6-1. Potential Other Waters of the U.S. include these streams and the reservoir pool upstream of the SCD. The majority of this acreage occurs within the San Clemente Reservoir.

Issue WET-1: Permanent Loss of Wetlands and Other Waters of the U.S.

Permanent loss of jurisdictional waters of the U.S.
Determination: ***less than significant with mitigation, long-term***

IMPACT

Potential impacts to wetland resources from Alternative 3 are similar to those for the Proponent's Proposed Project WET-1, although construction activities associated with Alternative 3 would result in the permanent loss of several acres of Other Waters of the U.S. due to the installation of the diversion dam and the elimination of San Clemente reservoir by the removal of SCD (Table 4.6-1).

MITIGATION

Mitigation measures applying to Impact Issue WET-1 under the Proponent's Proposed Project would be implemented. The restoration or conservation acreages would be adjusted to suit the affected acreage.

Issue WET-2: Short-term Disturbance of Wetlands and Other Waters of the U.S.

Short-term filling of fringe wetlands
*Determination****: Less than significant mitigation, short-term***

IMPACT

Potential impacts to wetland resources from Alternative 3 are similar to those for the Proponent's Proposed Project WET-2, except that construction activities associated with Alternative 3 would result in the short-term loss of a smaller area of fringe wetlands and Other Waters of the U.S. (Table 4.6-1) A temporary cofferdam would be placed in the Carmel River to divert the flow into a pipeline. A similar cofferdam may be placed in San Clemente Creek.

MITIGATION

Mitigation measures applying to Impact Issues WET-1 (Permanent Loss of Wetlands and other Waters of the U.S.) and WET-2 under the Proponent's Proposed Project would be implemented. The restoration or conservation acreages would be adjusted to suit the affected acreage.

Issue WET-3: Indirect Impacts to Wetlands and Other Waters of the U.S.

Indirect adverse impacts to vegetation, including increased erosion and sedimentation
Determination: ***less than significant with mitigation, short-term***

IMPACT

Potential impacts to wetland resources from Alternative 3 are similar to those for the Proponent's Proposed Project.

MITIGATION

Implementing mitigation measures applying to Impact Issue VE-4 would reduce Impact Issue WET-3 to less than significant.

Alternative 4 (No Project)

The area of potential effect for Alternative 4, the No Project Alternative, encompasses wetlands and Waters of the U.S. downstream of the Dam that may be affected when the reservoir has filled with sediment and uncontrolled sediment spills over the Dam spillway occur. No improvements would be made to the roads and the Dam would remain in its current condition.

Wetlands Issues WET-1 (Permanent Loss of Wetlands and Other Waters of the U.S.), Issue WET-2: (Short-term Disturbance of Wetlands and Other Waters of the U.S) and WET-3 (Indirect Impacts to Wetlands and Other Waters of the U.S.) do not apply to this alternative because there would be no construction activities.

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4.7 AIR QUALITY

This section describes the potential impacts of the San Clemente Seismic Safety Project and other action alternatives on the Air Quality in the Project Area. Air Quality includes ambient local and regional air quality influenced by the project. Additional information is provided in this Final EIR/EIS which clarifies and amplifies the information included in the Draft EIR/EIS. This environmental setting section was prepared using information developed from the documents provided by the RDEIR (Denise Duffy & Associates 2000). Air Quality analysis for the project was conducted using criteria, methodologies, and tools developed by the Monterey Bay Unified Air Pollution Control District (MBUAPCD), comprised of Santa Cruz, San Benito and Monterey Counties, and the United States EPA.[1] Calculation templates are included in Appendix X. Appendix Y presents a General Conformity Finding for the Proponent's Proposed Project under the General Conformity Rule adopted to comply with the federal Clean Air Act (CAA) Section 176(c).

4.7.1 ENVIRONMENTAL SETTING

Information in this section is derived from the 2004 Air Quality Management Plan (AQMP) for the Monterey Bay Region.

Climate and Meteorology

Carmel Valley is contained within the North Central Coast Air Basin (NCCAB) and thus is subject to the climate and meteorological conditions of the basin. The semi-permanent high-pressure cell in the eastern Pacific is the basic controlling factor in the climate of the air basin. In the summer, the high-pressure cell is dominant and causes persistent west and northwest winds over the entire California coast. Air descends in the Pacific High, forming a stable temperature inversion of hot air over a cool coastal layer. In the fall the winds become weak and the marine layer grows shallow, subsiding completely at times. During the winter the Pacific high moves to the south and has less influence on the air basin. Air frequently flows in a southeasterly direction out of the Salinas and San Benito valleys. Northwest winds are nevertheless still dominant in the winter, but easterly flow is more frequent. Inversion conditions, which tend to reduce the mixing and dilution of pollutants in the valley, are present throughout a significant part of the year.

Ambient Air Quality Standards

The 1970 federal CAA, amended in 1977 and 1990, identifies six criteria, or common, pollutants regulated by EPA on the basis of health and environmental effects:

- Reactive organic compounds/gases (ROC/ROG) as ozone (O_3) precursors[2]

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[1] An air quality analysis was conducted by Don Ballanti, certified consulting meteorologist, for the RDEIR on the Seismic Retrofit of SCD (DWR 2000). This analysis makes use of Ballanti's work where possible.

[2] ROC and ROG are alternate names for VOC and NMHC (i.e., nonmethane nonethane photochemically reactive hydrocarbons, C3 & up)

- Carbon monoxide (CO)
- Nitrogen oxides (NO and NO_2 as NO_X) as ozone (O_3) precursors
- Sulfur oxides (SO_2 and SO_3 as SO_X)
- Particulate matter, 10 microns or less and 2.5 microns or less (PM_{10} and $PM_{2.5}$)
- Lead (Pb)[3]

The regulated criteria pollutants and/or their derivatives (e.g., O_3) can cause significant negative health and environmental effects when ambient concentrations are high enough. The EPA and the California Air Resources Board (CARB) have established ambient air quality standards for criteria pollutants. Ambient air quality standards represent maximum allowable safe concentrations to avoid specific adverse health effects associated with each pollutant.

Federal and State of California ambient air quality standards are summarized in Table 4.7-1. These standards differ with regard to certain contaminants because they were developed separately with independent purposes and methods. Despite their differences, both sets of standards were determined with the intent of avoiding public health related effects.

Table 4.7-1: Current Federal and State Ambient Air Quality Standards[4]

Species Name	Averaging Time	California Standards		Federal Standards	
		ppmv	μ/m3	ppmv	μ/m3
Ozone (O_3)	1-hour	0.09	177	–	–
	8-hour	0.07	137	0.08	157
Carbon Monoxide (CO)	1-hour	20	22,890	35	40,057
	8-hour	9	10,300	9	10,300
	Lake Tahoe (8-hr)	6	6,867	–	–
Nitrogen Dioxide (NO_2)	1-hour	0.18	338	–	–
	Annual	0.03	56	0.053	100
Sulfur Dioxide (SO_2)	1-hour	0.25	654	–	–
	3-hour	–	–	0.50	1,308
	24-hour	0.04	105	0.14	366
	Annual	–	–	0.03	78
Particulates (as PM_{10})	24-hour	–	50	–	150
	Annual	–	20	–	–
Particulates (as $PM_{2.5}$)	24-hour	–	–	–	35
	Annual	–	12	–	15
Lead (Pb)	30-day	–	1.5	–	–
	90-day	–	–	–	1.5
Sulfates (as SO_4)	24-hour	–	25	–	–
Hydrogen Sulfide (H_2S)	1-hour	0.03	42	–	–
Vinyl Chloride	24-hour	0.01	26	–	–

ppm = parts per million
μ/m^3 = micrograms per cubic meter

[3] Lead is not applicable to this analysis since the project is not source of lead emissions
[4] CARB (2007) http://www.arb.ca.gov/research/aaqs/aaqs2.pdf

On July 18, 1997, EPA revised the ozone and particulate matter standards based on a comprehensive review of new scientific evidence. The EPA replaced the 1-hour ozone standard with an 8-hour ozone standard and supplemented the particulate matter standard with 24-hour and annual standards for fine particulate matter. Implementation of the new ozone standard was delayed until recently due to litigation. The federal one-hour standard for ozone was revoked on June 15, 2005, and replaced by the federal eight-hour ozone standard. The new federal and state standards for particulate matter 2.5 microns in diameter ($PM_{2.5}$) have been adopted as well. Ambient air quality is currently being monitored for these new standards at the Salinas and Santa Cruz air monitoring stations. These standards are in addition to existing standards for particulate matter 10 microns or less (PM_{10}).

2030 Baseline Conditions

The project site is within the NCCAB. The MBUAPCD operates a network of monitoring sites throughout the NCCAB. The four monitoring sites are located in Carmel Valley, King City, Monterey, and Salinas. An additional Salinas site has not been used since 1999. The monitoring site in Carmel Valley at Ford Road is the one in closest proximity to the project site, and monitors for ozone and PM_{10}.

One exceedence of the state ozone standard for PM_{10} was recorded at the Carmel Valley monitoring site in 1999, and two exceedences were recorded in 2001 and 2003 at the Salinas monitoring site. The 2004 AQMP states that in 2000 to 2003 the state ozone standard was exceeded on 24 station days or 17 air basin days for a total of 36 hours. The MBUAPCD meets criteria for nonattainment-transitional area. Tables 4.7-2 through 4.7-6 summarize relevant background data for ozone, PM_{10}, CO, and NO_2 [5]

Table 4.7-2: Ozone Trends Summary: Carmel Valley-Ford Road

Year	Days Exceeding Standard			Highest Concentration for O_3 (ppm)	
	1-hour State	1-hour Federal	8-hour Federal	1-hour average	8-hour average
2004	0	0	0	0.093	0.079
2003	0	0	0	0.082	0.074
2002	0	0	0	0.080	0.073
2001	0	0	0	0.085	0.079
2000	0	0	0	0.088	0.079
1999	0	0	0	0.080	0.067
1998	0	0	0	0.082	0.069
1997	0	0	0	0.080	0.072
1996	0	0	0	0.089	0.080
1995	0	0	0	0.093	0.077
1994	0	0	0	0.093	0.079

Notes: All concentrations expressed as parts per million. An exceedence is not necessarily a violation.
Source of data: CARB 2005

[5] For all tables: When State and Federal concentrations were provided, state numbers were used. In most cases, the state and federal numbers provided were the same, in some cases they differed slightly.

Table 4.7-3: Ozone Trends Summary: Salinas #3

Year	Days Exceeding Standard			Highest Concentration for O_3 (ppm)	
	1-hour State	1-hour Federal	8-hour Federal	1-hour average	8-hour average
2004	0	0	0	0.077	0.070
2003	0	0	0	0.073	0.063
2002	0	0	0	0.075	0.062
2001	0	0	0	0.076	0.069
2000	0	0	0	0.075	0.065

Notes: All concentrations expressed as parts per million. An exceedence is not necessarily a violation
Source of data: CARB

Table 4.7-4: Background Ambient PM_{10}: Carmel Valley & Salinas

Year	Salinas #3 Annual Mean for PM_{10} (µ/m3)	Carmel-Ford Annual Mean for PM_{10} (µ/m3)	Salinas #3 Highest 24-hour Concentration for PM_{10} (µ/m3)	Carmel-Ford Highest 24-hour Concentration for PM_{10} (µ/m3)
2004			41	33
2003		13	67	35
2002	18.5	14.8	46	35
2001			51	31
2000			37	28
1999				57
1998				29
1997		14.3		31
1996				24
1995		13.4		28
1994		15.3		31
Max	19	15	67	57

Notes: Concentrations corrected to 20 C (68 F)
Source of data:CARB

Table 4.7-5: Background Ambient CO: Salinas

Year	Highest 8-hour Concentration for CO (ppm)	Highest 8-hour Concentration for CO (µ/m3)
2004	1.21	1408
2003	1.09	1269
2002	1.38	1606
2001	1.64	1909
2000	1.40	1630
1999	1.79	2084
1998	2.18	2538
1997	1.79	2084
1996	2.56	2980
1995	2.13	2479
1994	2.06	2398
Max		2980

Notes: 1994 to 1999 Salinas Natividad Road #2, 1999 to 2004 Salinas #3. Concentrations corrected to 20 C (68 F)
Sources of data: CARB 2005

Table 4.7-6: Background Ambient NO_2: Salinas #3 & Salinas Natividad Road #2

Year	Annual Mean for NO_2 (ppm)	Annual Mean for NO_2 (μ/m3)	Highest Concentration for NO_2 (ppm)	Highest Concentration for NO_2 (μ/m3)
2004	0.007	13	0.139	266
2003	0.006	11	0.053	101
2002	0.007	13	0.049	94
2001	0.007	13	0.041	78
2000	0.007	13	0.071	136
1999	0.010	19	0.054	103
1998	0.010	19	0.085	163
1997	0.010	19	0.056	107
1996	0.011	21	0.060	115
1995	0.011	21	0.054	103
1994	0.012	23	0.067	128
Max		23		266

Notes: 1994 to -1999 Salinas Natividad Road #2, 1999 to 2004 Salinas #3. Concentrations corrected to 20 C (68 F)
Sources of data: CARB 2005

Table 4.7-7 shows aggregated historic and projected exceedences of the California 1-hour ozone standard (0.09 ppm) in the NCCAB for 1987 through 2030, respectively[6]. Projections for 2004 to 2030 are based on nonlinear trendline analysis of historic data from 1987 to 2003.[7] The trendline analysis shows an overall quantitative improvement in ambient air quality in the NCCAB from 1987 to 2003, with the expectation that implementation of district-wide NO_X and ROC emission control measures will continue to reduce ambient ozone levels in the future.

Air Quality Planning

The MBUAPCD shares responsibility with CARB and the EPA for ensuring that the State and National Ambient Air Quality Standards (NAAQS) are met within Monterey County. State law assigns local air districts the primary responsibility for control of air pollution from stationary sources while the State presides over control of mobile sources. The MBUAPCD is responsible for developing regulations that govern emissions of air pollution, permitting and inspecting stationary sources, and monitoring air quality and air quality planning activities.

Federally mandated air quality planning is regulated by the CAA Amendments of 1990 (CAAA). Historically, the NCCAB was classified as a moderate nonattainment area for ozone and either unclassified or attainment for all other pollutants. In 1994 the MBUAPCD submitted a redesignation request (requesting redesignation from nonattainment to attainment). As part of the redesignation process, the MBUAPCD, the Association of Monterey Bay Area Governments (AMBAG) and the San Benito County Council of Governments adopted a Maintenance Plan for the region.

[6] Rounded to nearest whole station day.
[7] Last available year of published reduced data is 2003.

Table 4.7-7: Exceedences of State Ozone Standard in NCCAB 1987 — 2030[8]

Calendar Year	Data Type	Basin-Wide Station Days	
		Lower Estimate	Upper Estimate
1987	Historic	42	42
1988	Historic	16	16
1989	Historic	12	12
1990	Historic	13	13
1991	Historic	14	14
1992	Historic	10	10
1993	Historic	17	17
1994	Historic	6	6
1995	Historic	8	8
1996	Historic	19	19
1997	Historic	1	1
1998	Historic	12	12
1999	Historic	3	3
2000	Historic	4	4
2001	Historic	3	3
2002	Historic	11	11
2003	Historic	3	3
2004	Projected	3	4
2005	Projected	3	4
2006	Projected	2	4
2007	Projected	2	4
2008	Projected	2	3
2009	Projected	2	3
2010-19	Projected	1	3
2020-30	Projected	0	2

With revocation of the federal one-hour ozone standard in 2005, the NCCAB is now designated either an attainment or unclassified area for all federal air quality standards[9] as applicable. The NCCAB is designated a nonattainment transitional area for the State one-hour ozone standard, a nonattainment area for the State PM_{10} standard, and an attainment area for the State CO standard in Monterey County.

The current attainment status of the NCCAB is listed in Table 4.7-8. The 1991 AQMP for the Monterey Bay Area was the first plan prepared in response to the California Clean Air Act of 1988 (CCAA) that established specific planning requirements to meet the ozone standard. The Act requires that the AQMP be updated every three years. The 2004 AQMP is the fourth update to the 1991 AQMP with the first three completed in 1994, 1997 and 2000, respectively. The AQMP addresses only attainment of the State ozone standard. Attainment of the PM_{10} standard is addressed in a separate report. The CCAA also requires the MBUAPCD to prepare and submit a report to CARB summarizing progress in meeting the schedules for developing, adopting or implementing the air pollution control measures contained in the MBUAPCD's plans. The report is due by December 31 of each year and is included in the AQMP.

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[8] MBUAPCD, 2004 AQMP, September 2004, Table 2-2.
[9] Under the Federal one-hour standard, the NCCAB was classified as a maintenance area for ozone.

Table 4.7-8: NCCAB Attainment Status [10]

Criteria Pollutant	Federal Status	State Status
Ozone –1 hour	Not Applicable	Nonattainment Transitional
Ozone – 8 hour	Attainment	Not Applicable
Carbon Monoxide	Unclassified/Attainment	Monterey – Attainment San Benito – Unclassified Santa Cruz – Unclassified
Nitrogen Dioxide	Unclassified/Attainment	Attainment
Sulfur Dioxide	Unclassified	Attainment
Inhalable PM_{10}	Attainment	Nonattainment
Inhalable $PM_{2.5}$	Unclassified	Not Applicable

Senate Bill No. 656 is a new planning requirement that calls for a plan and strategy for reducing $PM_{2.5}$ and PM_{10}. This bill requires CARB to identify, develop and adopt a list of control measures to reduce the emissions of $PM_{2.5}$ and PM_{10} from new and existing stationary, mobile, and area sources. The MBUAPCD has developed particulate matter control measures and submitted a plan to CARB that includes a list of measures to reduce particulate matter. Under the plan, the District is required to continue to assess $PM_{2.5}$ and PM_{10} emissions and their impacts. The PM plan was officially adopted by the District Board in December 2005.

The NCCAB is in attainment with the federal eight-hour ozone standard, whereas the air basin was a nonattainment area under the former one-hour ozone standard. The NCCAB is under the authority of the MBUAPCD which was required to write a Federal Maintenance Plan (FMP) in 1994 for ozone. This document still applies today. The MBUAPCD is not required to update the plan but is required to continue monitoring ozone emissions.

General Conformity

The federal CAA Section 176(c) prohibits federal entities from taking actions (e.g., funding, licensing, permitting, or approving projects) in NAAQS nonattainment or maintenance areas which do not conform to the State Implementation Plan (SIP) for the attainment and maintenance of NAAQS pursuant to Section 110(a) of the CAA. The purpose of conformity is to:

- Ensure federal activities do not interfere with the budgets in the SIP;
- Ensure actions do not cause or contribute to new violations;
- Ensure attainment and maintenance of the NAAQS.

Conformity to an implementation plan means:

[10] MBUAPCD, CEQA Air Quality Guidelines, October 1995 (last revised June 2004), Table 6-1

- Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards.

- That such activities would not: (1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area. The determination of conformity should be based on the most recent emissions, and such emissions should be determined from the most recent population, employment, travel, and congestion estimates as determined by the metropolitan planning organization or any other agency authorized to make such estimates.

Notwithstanding contemporaneous attainment status, the Proponent's Proposed Project would nevertheless comply with the conformity requirements as stated in Section 176(c) of the CAA. No entity may take action in this area that does not conform to the SIP for the attainment and maintenance of the NAAQS in the NCCAB. An analysis of impacts of the project to the NCCAB must be conducted prior to any project construction within the region.

4.7.2 ENVIRONMENTAL RESOURCE IMPACTS STANDARDS AND METHODS

Standards of Significance

In accordance with state and county CEQA Guidelines, MBUAPCD CEQA Air Quality Guidelines, and agency and professional standards, a project impact would be significant if it would:

- Violate any air quality standard or contribute to an odor problem;

- Cause a cumulatively considerable net increase in criteria pollutant emissions in nonattainment areas;

- Contribute substantially to an existing or projected air quality violation by exposing sensitive receptors (e.g., schools, daycare centers, hospitals, nursing homes) to substantial pollutant concentrations; or

- Be inconsistent with the AQMP.

The MBUAPCD has established recommended thresholds of significance to be used to evaluate air quality impacts for construction and operation. For direct and indirect operational impacts, the thresholds and estimated emissions for the Proponent's Proposed Project and Alternatives 1 through 4 are shown in Table 4.7-9.

Table 4.7-9: Comparison of Estimated Emissions for Significance

Project Option	NO_X	SO_X	CO	PM_{10}	VOC	PM_{10F}
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
Significance Threshold[11]	137	150	550	82	137	82
Proponent's Proposed Project	443	0	524	25	62	708
Alternative 1 (Dam Notching)	241	0	286	13	34	419
Alternative 2 (Dam Removal)	725	1	858	40	101	1257
Alternative 3 (Reroute and Removal)	491	0	572	27	68	1092
Alternative 4 (No Project)	0	0	0	0	0	0

As shown in Table 4.7-9, various project alternatives exceed MBUAPCD significance thresholds for daily mass emissions NO_X, CO, and fugitive PM_{10}., Determination of significance in this assessment is based on screening dispersion modeling[12] results which estimate relative ambient air quality impacts with respect to state and federal air quality standards. Thus, if a modeled concentration, when added to the maximum recent historic background concentration, does not exceed an applicable standard, it could be argued that there is no significant impact to ambient air quality from project alternative activities. However, the MBUDAPCD stated in its comments on the draft EIR that because it is a precursor to the formation of ozone in an air basin that is non-attainment for the state ozone standard, NO_X is a criteria pollutant of regional (not only local) significance and the distance of the nearest residential receptors does not eliminate the impact of emissions of 443 lbs/day, when the threshold of significance is 137 lbs/day. To the extent that NO_X emissions contribute to a regional incremental increase of NO_X, there could be a potential significant environmental impact on ambient air quality from project alternative activities.

Temporary emissions from construction activities consistent with the proposed project schedule are estimated for vehicle traffic, off-road equipment, and fugitive road dust. Blasting emissions are not included since there are no EPA-approved emission factors for civil demolition blasting. Also, blasting emissions would be transient (under one hour) and relatively small compared to other construction emissions, and therefore can be safely ignored in assessing daily and annual ambient impacts at the screening level.

Some roads used for the project would be improved with several inches of Class II base rock and a double chip seal coat. Paving reduces generation of road dust generally equivalent to watering of unpaved roads. All roads in this screening assessment are treated as moderately watered (continuously moist) for screening assessment purposes[13]. Fugitive PM_{10} emissions are based on equipment activity for each alternative that includes silt management, as applicable.

[11] MBUAPCD, CEQA Air Quality Guidelines, October 1995 (last revised June 2004), Table 5-1
[12] Refined dispersion modeling is beyond the scope of this study.
[13] A dry paved road with a fine layer of carryover dust is assumed to be generally equivalent to a moderately watered unpaved road in an industrial or construction setting for the screening assessment.

Screening Impact Assessment Methodology

For diesel-powered on-road trucks, CARB EMFAC 2002 output was used to estimate criteria pollutants (i.e., emission factors) in diesel exhaust (NO_X, SO_X, CO, PM_{10}, and ROC) pursuant to the following parameters (SO_X emission factors calculated from empirical values):

- Monterey Bay area
- Average annual emissions (i.e., 4-season)
- Model year 2000 with 100,000 miles (consistent with typical vehicle age)
- Standard inspection & maintenance (I/M) program
- 37.1 percent engine efficiency (South Coast Air Quality Management District [SCAQMD] CEQA Air Quality Handbook, Table A9-3-A)
- 15 ppm S in diesel fuel (required in California after 1/1/06)
- ROC includes exhaust, hot soak, and running loss

For fugitive PM_{10F} from road dust, from EPA AP-42 Chapter 13.2.2 equation 1a is applicable for vehicles on unpaved roads at industrial sites (EPA 2006):

$E = [K\ (S/12)^a\ (W/3)^b]\ [1-C]\ (453.59)$ g/mile, where:

K = 1.5	Constant, Table 13.2.2-2
S = 8.5	Silt content, percent Table 13.2.2-1
a = 0.9	Exponent, Table 13.2.2-2
W = 2.5 – 35	Mean vehicle weight in tons, varies per class
b = 0.45	Exponent, Table 13.2.2-2
C = 0.75	Default control efficiency, Fig. 13.2.2-2, minimum moisture ratio = 2

Table 4.7-10 shows the resultant emission factors for diesel exhaust and fugitive dust based on the above methodologies.

Table 4.7-10: On-Road Diesel Truck Emission Factors in Grams per Mile

Emission Factors	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
Type I Light Duty Truck	0.158	0.008	1.987	0.006	0.202	115
Type II Light Duty Truck	0.326	0.009	2.579	0.012	0.225	175
Medium Duty Truck	0.585	0.010	3.008	0.016	0.302	224
Type I Light Heavy Duty Truck	1.603	0.013	0.537	0.021	0.144	267
Type II Light Heavy Duty Truck	3.203	0.016	0.696	0.034	0.235	305
Medium Heavy Duty Truck	9.224	0.022	2.167	0.180	0.257	341
Heavy Heavy Duty Truck	12.785	0.036	0.810	0.146	0.249	375

The implementation of practical and cost-effective NO_X controls for diesel vehicles and equipment, such as Viscon, could reduce NO_X emissions up to 25 percent. However, reducing on-road vehicle emissions alone would not reduce NO_X emissions from project activities below significance (137 lb/day NO_X), since the bulk of these emissions are from off-road equipment, as summarized in Table 4.7-9 and detailed below. Since it is unlikely NO_X mass emissions could be reduced below the significance threshold, screening dispersion modeling is used to determine significance in this assessment, as described above.

For EIR/EIS preliminary screening analysis of off-road construction equipment, (URBEMIS 2002 Appendix H per 40 CFR 89.112 Tier 1) emission factors shown in Table 4.7-11 assume 37.1 percent efficiency (per SCAQMD CEQA guidelines) and use of California ultra-low sulfur diesel fuel (15 ppm S by weight). Please note: the Tier 1 factors were used in the preliminary estimate to account for the use of older, hired equipment (i.e., worst case). During the permitting process, it may be deemed appropriate to use Tier 2 factors, or a composite of Tier 1 and Tier 2 factors.

Appendix X contains tables showing information on the types of on-road vehicles to be used in the project and the projected utilization of each vehicle (average speed assumed is 15 mph). As explained above, EMFAC 2002 emission factors are used to estimate on-road vehicle emissions for the project alternatives.

The URBEMIS model is designed for estimating typical urban traffic impacts from residential, educational, recreational, retail, commercial, and industrial development. Non-typical projects such as dam construction work in a rural setting are not part of the URBEMIS model. As such, the URBEMIS model is not applicable for this type of project application. However, URBEMIS emission factors can be used to estimate off-road emissions as described above and shown in Table 4.7-11 below.

Table 4.7-11: Off-Road Diesel Equipment Emission Factors in Grams per BHP-hr[14]

Emission Factors	NO_X	SO_X	CO	PM_{10}	ROC
Off-Road Equipment (Tier 1)	6.9	0.005	8.5	0.4	1.0

[14] Same as U.S. EPA Tier 1, 40 CFR 89.112

Estimated truck and trip data was provided by Higgins & Associates (1998) for low, medium, and high increments (access road construction, dam thickening, and dam removal, respectively). Estimated off-road construction equipment and activity data was also provided for the Dam thickening (Proponent's Proposed Project) and dam removal (Alternative 2) scenarios. Based on these scenarios, empirical estimates were made for Alternatives 1 and 3. Emission calculations (Appendix X) were performed using standardized multi-variable spreadsheet templates designed to evaluate different project scenarios. As shown in Appendix X, estimated on-road NO_X emissions for the Proponent's Proposed Project and any of the Alternatives (1, 2, or 3) are 5 and 8 pounds per day, respectively, which is small compared to the majority off-road vehicle and equipment NO_X emissions.

The latest version of EPA's SCREEN3 (1995) gaussian plume dispersion model was used to calculate the ground level concentrations of criteria emissions. SCREEN3 is a single source Gaussian plume model which provides maximum ground-level concentrations for point, area, flare, and volume sources, as well as concentrations in the cavity zone, and concentrations due to inversion break-up and shoreline fumigation. The screening dispersion modeling options selected include the use of rural dispersion parameters and regulatory default options. The input file specified information regarding the subject emission sources including location, type (segmented area), and emission rate (g/sec). Default (internal) meteorological data were utilized in conjunction with the SCREEN3 model (i.e., stability class E, standard deviation or sigmatheta of horizontal wind direction between 3.8 and 7.5 degrees). Maps and aerial photographs of the project site and vicinity were used to determine approximate locations of emission sources and distances to receptors for the assessment. Release parameters used for the assessment are shown in Table 4.7-12.

Table 4.7-12: SCREEN 3 Release Parameters

Release Parameter	Units	4R	Dam	Access
Source Type	**Label**	**Area**	**Area**	**Area**
Long Side	meters	1360	600	1600
Short Side	meters	8	600	8
Long Side (segment)	meters	80	n/a	80
Release Rate (unit)	g/sec-m^2	1	1	1
Release Rate (segment)	g/sec-m^2	0.059	n/a	0.050
Release Height	meters	2.5	25	2.5
Receptor Height	meters	1.5	1.5	1.5
Dispersion Coefficient	Urban/Rural	Rural	Rural	Rural
Range of Directions	Yes/No	Yes	Yes	Yes
Stability Class	A-F	E	E	E
Automated Distance Array	Yes/No	Yes	Yes	Yes
Minimum Distance	meters	10	10	10
Maximum Distance	meters	1000	1000	1000

It should be noted that the screening model in area source mode (e.g., 8 m x 80 m road segments which simulate a line source) does not take into account 1) actual meteorology data, 2) complex terrain, and 3) downwash. It is a basic tool for ranking relative impacts assuming hypothetical "worst case" stability class E, which is sigmatheta (standard deviation) of horizontal wind direction between 3.8 and 7.5 degrees. Nevertheless, the impact assessment conservatively demonstrates that while the project does not significantly impact or degrade existing ambient concentrations of CO, PM_{10} (primarily from road dust) is increased and thus would require mitigation (e.g., sufficient periodic road watering). While the modeled concentration of NO_X, when added to the maximum recent historic background concentration, does not exceed an applicable standard, the MBUBAPCD has expressed concerns regarding the incremental addition of NO_X to regional air quality levels. Mitigation measures to reduce NO_X are discussed below.

4.7.3 IMPACTS AND MITIGATION

The following impact issues have been defined for air quality:

AQ-1: Dam Site Activities (short-term emissions from construction equipment and road dust)

AQ-2: Access Road Upgrades (short-term dust and other emissions during access road improvements)

AQ-3: Project-Generated Traffic (short-term dust and other emissions during project-related travel)

AQ-4: Concrete Batch Plant Operation (operation of a new, short-term stationary source)

Proponent's Proposed Project (Dam Thickening)

Issue AQ-1: Dam Site Activities

Short-term emissions from construction equipment and road dust
Determination: ***significant, unavoidable, short-term***

IMPACT

Construction activities would generate temporary emissions from diesel-powered equipment and road dust. Fugitive dust, if not mitigated, could exceed the MBUAPCD construction threshold of significance for PM_{10} only. This would be a potentially significant unavoidable impact.

The Proponent's Proposed Project would have no operational impacts because it would not create any new air pollutant sources nor generate new employee vehicle trips. The Proponent's Proposed Project would affect regional and local air quality during construction. The level and types of activities would vary over the construction period, but the activities with the greatest potential to generate air pollutants are materials delivery (aggregates); and concrete placement (pouring, securing). These phases represent the periods of greatest pollutant generation, at other times less-polluting activities such as land surveying, land clearing, reservoir dewatering, site preparation, and integrity testing would occur.

SCD is in an isolated portion of the Carmel River Valley. During daytime hours, prevailing winds would carry emissions up-river or towards the east. The closest receptors are residences in the Sleepy Hollow Subdivision, which is located along San Clemente Drive, as shown in Figure 4.7-1. These homes would be quite distant (3900 to 5300 meters from the Dam site) and generally upwind of construction activity at the Dam itself. Therefore localized dust created by sand blasting and drilling dowel holes during preparation of the existing dam surface would not impact any receptors. Emissions associated with concrete trucks hauling materials from the batch plant to the Dam site would also occur at a substantial distance and downwind of these receptors.

Tables 4.7-13 and 4.7-14 show estimated aggregated maximum emissions in pounds per day and tons per year at the Dam for the various activities that would occur during project construction. Two primary types of emission sources have been estimated: 1) diesel fuel combustion in vehicle and equipment engines, and 2) generation of fugitive road dust (PM_{10F}). The tables distinguish the generation of fugitive dust (PM_{10F}) from PM_{10} emitted from combustion sources (due to different emission estimation techniques), although the same standard applies to both.

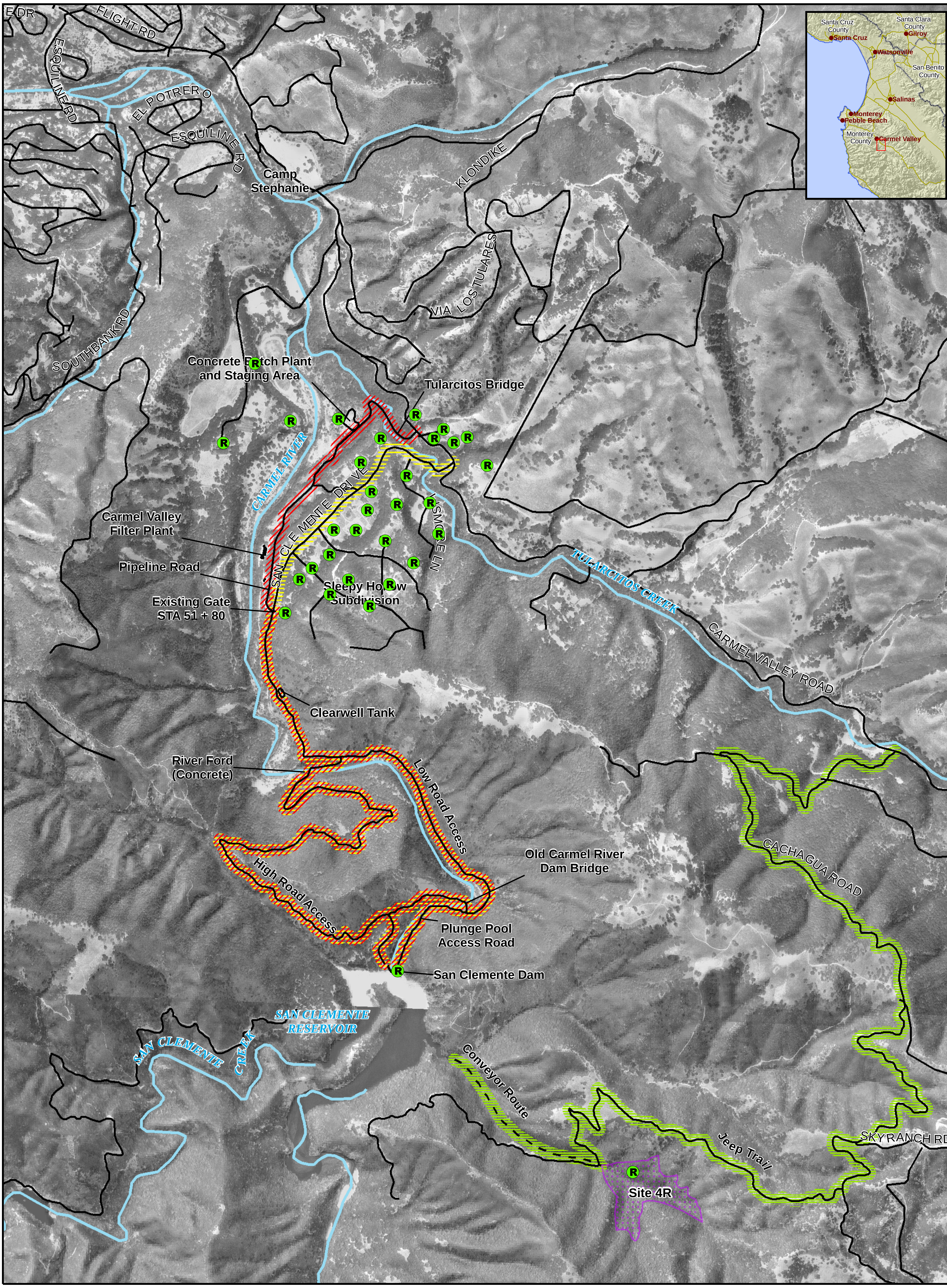
Table 4.7-13: Estimated Temporary Daily Construction Emissions — Proponent's Proposed Project

Location	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
Dam Site	430	0	523	25	62	322

Table 4.7-14: Estimated Temporary Annual Construction Emissions — Proponent's Proposed Project

Location	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Dam Site	54	0	66	3	8	23

Table 4.7-13 shows that estimated daily emissions from fuel combustion at the Dam and sediment handling could exceed the 137 pound per day level of significance for NO_X contained in Table 4.7-9. However, Tables 4.7-15 and 4.7-16 show that maximum estimated NO_X impacts would be below state and federal ambient air quality standards (338 μ/m3 hourly and 100 μ/m3 annual, respectively).



Legend

Access Routes
- Cachugua / 4R
- Sleepy Hollow
- Tularcitos
- Sleepy Hollow / Tularcitos*

- Stream
- Existing Road
- Proposed Road
- Sediment Disposal Site

- R Sensitive Receptor

*Note: Sleepy Hollow and Tularcitos access routes share the same roads between the filter plant and the dam

Projection: California State Plane, Zone IV
Datum: NAD 83 Units: Feet

San Clemente Dam EIS/EIR

Figure 4.7-1

Sensitive Receptors Map

0 0.15 0.3 0.6
Miles
N

C:\GIS\entrix\3018605\map\SC_Sensitive_Receptors_17i11i_04.mxd 9/22/2005 3:26:56 PM Mukhtyar

Table 4.7-15: Estimated NO_X Impact in Residential Zone Proponent's Proposed Project

Criteria Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Nitrogen Oxides (as NO_2)	1-hour	5.7	266	272
	Annual	0.5	23	23

Table 4.7-16: Estimated NO_X Impact at Dam Site Proponent's Proposed Project

Criteria Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Nitrogen Oxides (as NO_2)	1-hour	41.6	266	308
	Annual	3.3	23	26

Incremental ambient NO_X in the residential zone is 5.7 μ/m3, an increase of 2.1 percent above the maximum hourly background concentration of 266 μ/m3 for a total of 272 μ/m3, which is under the state standard of 338 μ/m3. Such an increase would not be measurable by an ambient NO_X monitor since it lies within the daily calibration bandwidth of the instrument (2.5 percent Hourly NO_X impacts at the Dam site are slightly greater, 15.6 percent but still below the state standard. The federal annual NO_X standard of 100 μ/m^3 is not exceeded at the residential zone or the Dam site is. The nearest residential receptors are located far enough from the Dam site (3,900 to 5,300 meters) that only a limited amount of dispersed NO_X would be transported by wind due to diffusion. Although very small, there may be an incremental significant unavoidable impact on ambient air quality in distant residential areas or at the Dam site from NO_X emissions, because these emissions are above the mass emissions significance threshold.

Estimated emissions of fugitive dust (PM_{10F}) could potentially exceed the PM_{10} threshold of 82 lb/day by a significant amount, thus requiring mitigation in order to minimize ambient air impacts. Table 4.7-17 summarizes the PM_{10} impacts of the Proponent's Proposed Project.[15]. The 550 pound per day CO level of significance is not exceeded by the Proponent's Proposed Project.

Table 4.7-17: Estimated PM_{10} Impact Summary Proponent's Proposed Project

Location	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Dam Site Average	1-hour	33.6	–	–
	24-hour	13.4	57	70
	Annual	2.7	15	18

[15] For a description how emission rates (lb/day) are translated to ambient air impacts (μ/m3), refer to Impact Assessment Methodology at the end of this section.

MITIGATION

There are several feasible mitigation measures that address the many sources of PM_{10} during the construction phase of a project (e.g., grading, wind erosion, entrained dust). Common measures include watering, chemical stabilization, or reducing surface wind speeds with windbreaks. Summarized below are feasible mitigation measures for PM_{10}, the source of emissions that would be affected, the effectiveness of the measure in mitigating emissions, and the source of assumptions. The effect of a mitigation measure can be quantified by identifying the source of PM_{10} that would be affected, estimating emissions from the source, and applying a mitigation effectiveness factor to those emissions. For example, watering active, unpaved construction areas with full coverage can reduce fugitive PM_{10} from construction equipment and other mobile sources by 50 percent, reducing daily emissions from 70 lb/day/acre to 35 lb/day/acre.

Because construction-related emissions of PM_{10} vary based on a number of factors (e.g., activity types, area of activity, silt content), the level of mitigation necessary to reduce impacts below significance would vary and would be monitored during construction by the owner's engineer or consultant, to assure that actual mitigation is effective. In general, mitigation measures that address larger sources of PM_{10} during construction (e.g., grading, excavation, entrained dust from unpaved roads) have the greatest potential to substantially reduce fugitive dust to a less than significant level. Mitigation measures for the Proponent's Proposed Project include:[16]

- Water all active construction areas and access roads at least twice daily. Frequency would be based on the type of operation, soil, and wind exposure.
- Prohibit all grading (e.g., sediment removal) activities during periods of high wind (over 15-mph).
- Apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction projects that are unused for at least four consecutive days).
- Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut and fill operations and hydroseed area.
- Haul trucks would maintain at least 2 feet of freeboard.
- Cover all trucks hauling dirt, sand, or loose materials.
- Seed or plant vegetative ground cover in disturbed areas as soon as possible.
- Cover inactive storage piles with tarps
- Post a publicly visible sign giving the telephone number and person to contact regarding dust complaints. This person would respond to complaints and take

[16] MBUAPCD, CEQA Air Quality Guidelines, October 1995 (last revised June 2004), Table 8-2

corrective action within 48 hours. The phone number of the MBUAPCD would be visible to ensure compliance with Rule 402 (Nuisance).

Emissions of NO_X from heavy duty equipment would be reduced by using practical and cost-effective NO_X controls for diesel vehicles and equipment in order to minimize emissions. Since daily CO emissions are below the level of significance, no CO mitigation would be required. The Applicant would implement practical and cost-effective PM_{10} controls for access roads, including paving and coarse graveling, in addition to periodic watering, along with practical and cost-effective NO_X controls for diesel vehicles and equipment, such as Viscon[17]. The Applicant would utilize, to the maximum extent possible, state-certified construction equipment in the Portable Equipment Registration Program (PERP) which is pre-approved for use in any district by CARB. The applicant would work closely with district staff upon commencement of permitting activities consistent with project scheduling requirements.

Issue AQ-2: Access Road Upgrades

Short-term dust and other emissions during access road improvements
Determination: ***significant, unavoidable, short-term***

IMPACT

Construction activities during access road improvements would sometimes be upwind of residential neighborhoods and, if not mitigated, create the potential for dust nuisance complaints. This would be determined by several factors, including the amount of emissions, distance between the source of emission and receptors, and prevailing wind direction when construction activities occur.

Access road associated emissions would be relatively small compared to proposed and alternative project emissions. The small differences in emissions between the San Clemente Drive or Tularcitos access routes would have little effect on the comparative ambient air quality impacts of the Proponent's Proposed Project and action alternatives. Therefore, a typical set of access road-related emissions have been developed for evaluation of the routes. The results presented in Tables 4.7-18 and 4.7-19 for the existing (San Clemente Drive) access route and the alternative (Tularcitos) demonstrate the negligible difference between the two routes. These data indicate that for the Proponent's Proposed Project, the greatest potential for dust nuisance would occur during construction of access road improvements and during the aggregate delivery phase of the project, when up to 20 trucks trips per day would use the improved access road and from cement trucks hauling from the batch plant to the Dam. Depending on the weather and the types of amounts of activity along the new access road, a temporary potential for dust nuisance could exist at the closest homes within the Sleepy Hollow Subdivision prior to implementation of mitigation measures, as discussed below.

[17] While Viscon can reduce NOx emissions by about 25 percent, the use of Viscon would not lower NO_X emissions below the 137 pound per day significance threshold (0.75 x 443 lb/day = 332 lb/day).

Table 4.7-18: Estimated Daily Construction Emissions — Road Construction

Location	NO_X	SO_X	CO	PM_{10}	VOC	PM_{10F}
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
San Clemente Drive	0.43	0.00	0.10	0.01	0.01	16
Tularcitos Route	0.41	0.00	0.10	0.01	0.01	15
Typical	0.42	0.00	0.10	0.01	0.01	16

Table 4.7-19: Estimated Annual Construction Emissions — Road Construction

Location	NO_X	SO_X	CO	PM_{10}	VOC	PM_{10F}
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
San Clemente Drive	0.02	0.00	0.01	0.00	0.00	0.8
Tularcitos Route	0.02	0.00	0.00	0.00	0.00	0.7
Typical	0.02	0.00	0.01	0.00	0.00	0.8

Table 4.7-18 shows that estimated daily emissions from fuel combustion would not exceed any level of significance contained in Table 4.7-1. However, estimated emissions of fugitive dust (PM_{10F}) could potentially be about one-half the PM_{10} threshold of 82 lb/day. At this level of emission, mitigation would be a good construction site practice. Due to the nuisance level that could occur to residence of Sleepy Hollow, the impact would be significant and unavoidable for short periods of time.

MITIGATION

Dust generation due to travel on unpaved roads between the batch plant and the Dam is a potentially significant impact (see Table 4.7-13) that could be reduced to a less than significant level by requiring contractors to minimize dust generation during construction through implementation of the following dust suppression techniques, which could reduce fugitive PM_{10} emissions from unpaved roads below the 82 lb/day threshold:

- Use crushed rock as a final base on the unpaved service roads from Center Court Place to the Batch Plant, and from the Batch Plant to the Filter Plant to minimize dust generation in the vicinity of the Sleepy Hollow subdivision. According to the project engineer, placement of crushed rock would make the roads more driveable and would also keep dust down.

- Use watering trucks and adequate quantities of water to suppress dust on unpaved or unrocked roads, parking areas, staging areas and the batch plant. Water quality BMPs (see Section 4.5) would avoid introducing sediment into the river and creeks. The amount and frequency of water application would be adjusted for weather conditions to maintain a minimum average soil moisture ratio of 5, for 95 percent or greater dust suppression. Non-toxic chemical stabilizers or dust suppressants would be applied to unpaved haul roads. These may consist of materials that are added to the water prior to application, or materials worked into the road surface that increases the efficiency of subsequent wetting with water.

- As traffic and weather allow, regularly vacuumsweep (municipal street sweeper) accumulated soil from the surface of Center Court Place and affected portions of San Clemente Drive to prevent introducing sediment into river and creeks.

- Impose and enforce a 15-mph speed limit for all vehicles on unpaved haul roads.

The Applicant would implement practical and cost-effective PM_{10} controls for access roads, including paving and coarse graveling, in addition to periodic watering, along with practical and cost-effective NO_X controls for diesel vehicles and equipment, such as Viscon[18]. The Applicant will utilize, to the maximum extent possible, state-certified construction equipment in the PERP, which is pre-approved for use in any district by the Air Resources Board. The Applicant will work closely with district staff upon commencement of permitting activities consistent with project scheduling requirements.

Issue AQ-3: Project-Generated Traffic

Short-term dust and other emissions during project-related travel

Determination: ***significant, unavoidable, short-term***

Construction activities during access road improvements and truck travel on the unpaved service road to and from the concrete batch plant site would sometimes be upwind of residential neighborhoods and, if not mitigated, create the potential for dust nuisance complaints.

Worker travel consists of motor vehicle exhausts from contractor employee trips to and from the project site. Truck travel represents on-road trucks delivering construction materials to the site. Fugitive emissions are mainly the result of mechanical action of vehicle wheels on unpaved earth surfaces. On-site vehicles and equipment consist of concrete trucks and other diesel-powered construction equipment. Unpaved road dust would be raised by the material delivery and concrete trucks traveling on the graveled interior haul roads.

Use of existing paved roads and improvement of unpaved access roads to the concrete batch plant site and the CVFP should generate less than significant levels of dust during the road building phase. However, as shown in Table 4.7-9, PM_{10} emissions could exceed the MBUAPCD threshold during material delivery and concrete placement. This would primarily be due to travel on unpaved roads between the CVFP and Dam.

Again, emissions associated with project-generated traffic would vary relatively little between the Proponent's Proposed Project and the action alternatives. The analysis utilized the roads nearest the receptor area to access PM_{10} impacts on those receptors.

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[18] While Viscon can reduce NO_X emissions by about 25 percent, the use of Viscon would not lower NO_X emissions below the 137 pound per day significance threshold (0.75 x 443 lb/day = 332 lb/day).

Although the routes for the alternatives are different from the Proponent's Proposed Project, the distance to the receptor location via each route is approximately the same. These small differences in emissions would have negligible effect on comparative ambient air quality impacts. Therefore, a typical set of project traffic-related emissions have been developed for evaluation of all of the alternatives.

Typical fugitive dust (PM_{10F}) emissions are shown in Table 4.7-20 in terms of background concentrations, modeled increments that result from project-related traffic, and total resulting concentrations. Estimated emissions of fugitive dust (PM_{10F}) could exceed the PM_{10} threshold of 82 lb/day, which would be a significant unavoidable impact.

Table 4.7-20: Estimated PM_{10} Impact Summary
Proponent's Proposed Project

Location	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Access Roads (typical)	1-hour	10.6	–	–
	24-hour	4.2	57	61
	Annual	0.8	15	16

MITIGATION

The project impact identified above could be reduced with implementation of Mitigation Measure AQ-2 (Access Road Upgrades) and the following additional measures:

Provide Sleepy Hollow residents with a card containing the telephone number and person to contact regarding dust, traffic and noise complaints as well as providing construction schedule information. This person would respond to complaints and arrange for corrective action to be taken within 24 hours. The phone number of the MBUAPCD would also be provided.

The applicant would be responsible for ensuring that the mitigation measures are implemented. Agencies and local government issuing permits would enforce compliance with permit conditions. Construction monitoring would be conducted to assure that permit requirements, resource protection measures, and mitigation measures are followed. The owner's contracts would embody pertinent requirements, and the applicant would require contractors to comply with the terms of their contracts. The project management would post a publicly visible sign in the Sleepy Hollow area giving the telephone number and project contact person to contact regarding dust or noise complaints:

- The project contact person would respond to complaints and take corrective action within 48 hours.

- Corrective actions would require that all fugitive dust and noise mitigation measures listed above be verified (i.e., checked and inspected) for implementation and effectiveness.

- As a backstop measure, the complaint line telephone numbers of the MBUAPCD and Monterey County Resource Management Agency would also be posted to ensure compliance with applicable nuisance rules (e.g., MBUAPCD Rule 402, Nuisance).

Issue AQ-4: Concrete Batch Plant Operation

Operation of a new, short-term stationary source
Determination: ***less than significant with mitigation, short-term***

The concrete batch plant would be subject to regulation by the MBUAPCD as a temporary stationary source. In general, New Source Review (NSR) rules would require the following conditions to be met in order to obtain an operating permit:

- Best Available Control Technology (BACT);

- Offsets (nonattainment pollutants over regulatory threshold);

- Protection of ambient air quality;

- Certification of statewide compliance for all sources under common ownership and/or operational control; and

- For sources subject to CEQA, analysis of alternatives.

Under MBUAPCD rules, a nonexempt stationary source must be permitted, and a permit would not be issued unless the proposed source meets all applicable MBUAPCD rules and regulations regarding emission limits, opacity limits, control requirements, offsets and other limitations or conditions. The MBUAPCD also enforces compliance with Rule 402 (Nuisance).

MITIGATION

Under general NSR rules described above, batch plant emissions would be mitigated by jurisdictional MBUAPCD temporary source operating permit conditions, which would likely require powering of the batch plant with electricity (i.e., no diesel fuel combustion emissions) and fugitive dust control measures (e.g., water sprays, pneumatic dust collectors).

The batch plant requires a level area approximately 5 acres (about 218,000 square feet) in size with good road access in order to move in/out the larger pieces of batch pant equipment and aggregate materials. This limits possible sites for the batch plant to generally near Carmel Valley Road, and not up the canyon closer to the Dam due to mountainous terrain and narrow, winding access roads. Thus, it is not technically feasible to locate the batch plant closer to the Dam. Also, the proximity of electric power lines may avoid the use of diesel generators for batch plant operation, thus avoiding emissions of NO_X, CO, ROC, SO_2 , and diesel fine particulate (PM_{10}).

The Applicant will work closely with district staff upon commencement of permitting activities consistent with project scheduling requirements.

Alternative 1 (Dam Notching)

Impacts and mitigation for Air Quality Issues AQ-2 (Access Road Upgrades) and AQ-3 (Project-Generated Traffic) would be the same as the Proponent's Proposed Project except the mitigation would also include the Cachagua Access Route. Issue AQ-4 (Concrete Batch Plant) would not apply to Alternative 1.

Issue AQ-1: Dam Site Activities

Short-term emissions from construction equipment and road dust
Determination: ***significant, unavoidable, short-term***

Refer to Proponent's Proposed Project for a general discussion of construction activities as they relate to air quality effects. For Alternative 1, Tables 4.7-21 and 4.7-22 show estimated aggregated maximum emissions in pounds per day and tons per year that would occur at the dam site and sediment disposal site.

Table 4.7-21: Estimated Daily Construction Emissions Alternative 1

Location	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
Sediment Disposal Site	9	0	1	0	0	254
Dam Site	233	0	285	13	34	164
Totals	241	0	286	13	34	419

Table 4.7-22: Estimated Annual Construction Emissions Alternative 1

Location	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Sediment Disposal Site	0	0	0	0	0	13
Dam Site	35	0	43	2	5	25
Totals	35	0	43	2	5	37

Table 4.7-23 shows estimated daily emissions from fuel combustion at the Dam and sediment disposal sites. Impacts are similar to those discussed for the Proponent's Proposed Project in that although emissions at these sites could exceed the level of significance for mass emissions of $NO_{X,}$ maximum estimated NO_X impacts to the nearest residential receptors would be below the state and federal ambient air quality standards (338 μ/m3 hourly and 100 μ/m3 annual, respectively) (Tables 4.7-23 and 4.7-24).

Table 4.7-23: Estimated NO_X Impact in Residential Zone Alternative 1

Criteria Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Nitrogen Oxides (as NO_2)	1-hour	3.8	266	270
	Annual	0.3	23	23

Table 4.7-24: Estimated NO_X Impact at Dam Site Alternative 1

Criteria Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Nitrogen Oxides (as NO_2)	1-hour	22.5	266	289
	Annual	1.8	23	25

Although very small, there may be a significant unavoidable impact on ambient air quality in distant residential areas or at the dam site from NO_X emissions, because these emissions are above the mass emissions significance threshold. As for Alternative 1, estimated emissions of fugitive dust (PM_{10F}) could exceed the PM_{10} threshold (Table 4.7-25).

Table 4.7-25: Estimated PM_{10} Impact Summary Alternative 1

Location	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Site 4R Average	1-hour	125.6	–	–
	24-hour	50.2	57	107
	Annual	10.0	15	25
Dam Site Average	1-hour	17.2	–	–
	24-hour	6.9	57	64
	Annual	1.4	15	16

Neither the residential zone nor the dam site exceeds the federal annual NO_X standard of 100 μ/m3. The nearest residential receptors are located far enough from the dam site (3900 to 5300 meters); only a limited amount of dispersed NO_X would be transported by wind due to diffusion. Although very small, there may be an incremental, significant unavoidable impact on ambient air quality in distant residential areas or at the dam site from NO_X emissions, because these emissions are above the mass emissions significance threshold.

MITIGATION

Air quality mitigation measures would be the same as for the Proponent's Proposed Project.

Alternative 2 (Dam Removal)

Impacts and mitigation for Air Quality Issues AQ-2 (Access Road Upgrades) and AQ-3 (Project-Generated Traffic) would be the same as the Proponent's Proposed Project except the mitigation would also include the Cachagua Access Route. Issue AQ-4 (Concrete Batch Plant) would not apply to Alternative 2.

Temporary emissions from construction activities associated with Alternative 2 are estimated for vehicle traffic, off-road equipment, and fugitive road dust. Blasting emissions are not included since there are no EPA-approved emission factors for civil demolition blasting. Also, blasting emissions would be transient (under one hour) and relatively small compared to other construction emissions, and therefore can be safely ignored in assessing daily and annual ambient impacts at the screening level.

Issue AQ-1: Dam Site Activities

Short-term emissions from construction equipment and road dust
Determination: ***significant, unavoidable, short-term***

Refer to Proponent's Proposed Project (Dam Thickening) for a general discussion of activities as they relate to air quality effects. For Alternative 2, Tables 4.7-26 and 4.7-27 show estimated aggregated maximum emissions in pounds per day and tons per year that would occur at the dam site and sediment disposal site.

Table 4.7-26: Estimated Daily Construction Emissions Alternative 2

Location	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
Site 4R	26	0	2	0	1	763
Dam Site	699	1	856	40	101	494
Totals	725	1	858	40	101	1257

Table 4.7-27: Estimated Annual Construction Emissions Alternative 2

Location	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr
Site 4R	1	0	0	0	0	38
Dam Site	105	0	128	6	15	74
Totals	106	0	128	6	15	112

Table 4.7-26 shows estimated daily emissions from fuel combustion at the Dam and sediment disposal sites. Impacts are similar to those discussed for the Proponent's Proposed Project in that although emissions at these sites could exceed the level of significance for mass emissions of NO_X and CO, maximum estimated NO_X and CO impacts to the nearest residential receptors would be below the state and federal ambient air quality standards (Tables 4.7-28 and 4.7-29).

Table 4.7-28: Estimated NO_X and CO Impact in Residential Zone Alternative 2

Criteria Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Nitrogen Oxides (as NO_2)	1-hour	11.3	266	277
	Annual	0.9	23	24
Carbon Monoxide (CO)	1-hour	2.7	4257	4260
	8-hour	1.9	2980	2982

Table 4.7-29: Estimated NO_X and CO Impact at Dam Site Alternative 2

Criteria Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	μ/m3	μ/m3
Nitrogen Oxides (as NO_2)	1-hour	67.7	266	334
	Annual	5.4	23	28
Carbon Monoxide (CO)	1-hour	82.9	4257	4340
	8-hour	58.0	2980	3038

Although very small, there may be an incremental significant unavoidable impact on ambient air quality in distant residential areas or at the dam site from NO_X emissions, because these emissions are above the mass emissions significance threshold. As with Alternative 2, estimated emissions of fugitive dust (PM_{10F}) could exceed the PM_{10} threshold (Table 4.7-30).

Table 4.7-30: Estimated PM_{10} Impact Summary Alternative 2

Location	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		μ/m3	υg/m3	μ/m3
Site 4R Average	1-hour	377.1	–	–
	24-hour	150.8	57	208
	Annual	30.2	15	45
Dam Site Average	1-hour	51.7	–	–
	24-hour	20.7	57	78
	Annual	4.1	15	19

MITIGATION

Air quality mitigation measures would be the same as for the Proponent's Proposed Project.

Alternative 3 (Carmel River Reroute and Dam Removal)

Impacts and mitigation for Air Quality Issues AQ-2 (Access Road Upgrades) and AQ-3 (Project-Generated Traffic) would be the same as the Proponent's Proposed Project except mitigation would also include the Cachagua Access Route. Issue AQ-4 (Concrete Batch Plant) would not apply to Alternative 3.

Short-term emissions from construction activities associated with the Alternative 3 are estimated for vehicle traffic, off-road equipment, and fugitive road dust. Blasting emissions are not included since there are no EPA-approved emission factors for civil demolition blasting. Also, blasting emissions would be transient (under one hour) and relatively small compared to other construction emissions, and therefore can be safely ignored in assessing daily and annual ambient impacts at the screening level.

Issue AQ-1: Dam Site Activities

Short-term emissions from construction equipment and road dust
Determination: ***significant, unavoidable. short-term***

Refer to Proponent's Proposed Project for a general discussion of activities as they relate to air quality effects. For Alternative 3, Tables 4.7-31 and 4.7-32 show estimated aggregated maximum emissions in pounds per day and tons per year that would occur at the dam site and reservoir.

Table 4.7-31: Estimated Daily Construction Emissions Alternative 3

Location	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	Lbs/day
Sediment Site	26	0	2	0	1	763
Dam Site	465	0	570	27	67	329
Totals	491	0	572	27	68	1092

Table 4.7-32: Estimated Annual Construction Emissions Alternative 3

Location	NO_X	SO_X	CO	PM_{10}	ROC	PM_{10F}
	tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	Tons/yr
Sediment Site	1	0	0	0	0	38
Dam Site	70	0	86	4	10	49
Totals	71	0	86	4	10	87

Table 4.7-31 shows estimated daily emissions from fuel combustion at the Dam and sediment disposal sites. Impacts are similar to those discussed for the Proponent's Proposed Project in that although emissions at these sites could exceed the level of significance for mass emissions of NO_X and CO, maximum estimated NO_X and CO impacts to the nearest residential receptors would be below the state and federal

ambient air quality standards (Tables 4.7-33 and 4.7-34). Although very small, there may be an incremental significant, unavoidable impact on ambient air quality in distant residential areas or at the dam site from NO_X emissions, because these emissions are above the mass emissions significance threshold. As with the Proponent's Proposed Project, estimated emissions of fugitive dust (PM_{10F}) could exceed the PM_{10} threshold (Table 4.7-35).

Table 4.7-33: Estimated NO_X and CO Impact in Residential Zone Alternative 3

Criteria Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		µ/m3	µ/m3	µ/m3
Nitrogen Oxides (as NO_2)	1-hour	7.6	266	274
	Annual	0.6	23	24
Carbon Monoxide (CO)	1-hour	1.8	4257	4259
	8-hour	1.2	2980	2981

Table 4.7-34: Estimated NO_X and CO Impact at Dam Site Alternative 3

Criteria Pollutant	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		µ/m3	µ/m3	µ/m3
Nitrogen Oxides (as NO_2)	1-hour	45.1	266	311
	Annual	3.6	23	27
Carbon Monoxide (CO)	1-hour	55.2	4257	4312
	8-hour	38.6	2980	3019

Table 4.7-35 Estimated PM_{10} Impact Summary Alternative 3

Location	Averaging Period	Modeled Concentration	Background Concentration	Total Concentration
		µ/m3	µ/m3	µ/m3
Sediment Site Average	1-hour	377.1	–	–
	24-hour	150.8	57	208
	Annual	30.2	15	45
Dam Site Average	1-hour	34.4	–	–
	24-hour	13.8	57	71
	Annual	2.8	15	18

MITIGATION

Air quality mitigation measures would be the same as for the Proponent's Proposed Project.

Alternative 4 (No Project)

No construction activities would be associated with the No Project Alternative; therefore there would be no additional issues related to air quality.

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4.8 NOISE

This section describes the potential impacts of the San Clemente Seismic Safety Project on the noise characteristics in the Project Area. Noise characteristics include sensitive receptors influenced by the project. In response to comments, additional information provided in this Final EIR/EIS clarifies and amplifies the information included in the Draft EIR/EIS. The following environmental setting section was prepared using information developed from the documents provided by the RDEIR (Denise Duffy & Associates 2000).

4.8.1 ENVIRONMENTAL SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is defined as unwanted sound. Environmental noise is frequently measured in decibels (dB). The A-weighted decibel (dBA) refers to the human ear's sensitivity to sounds of different frequencies. On this scale, the sound level of normal talking is about 60 to 65 dBA. Due to evolutionary factors, humans are more sensitive to nighttime noise; sleep disturbance usually occurs at 40 to 45 dBA.

The most commonly used measurement scale to account for a person's increased sensitivity to nighttime noise is the community noise equivalent level (CNEL). The CNEL is a noise scale used to describe the overall noise environment of a given area from a variety of sources. The CNEL applies a weighting factor to evening and nighttime values.

Excessive noise may not only be undesirable, but also may cause physical and/or psychological damage. The effects of noise, whether ambient or project-related, may be categorized as auditory or non-auditory. Auditory effects include interference with communication and, in extreme circumstances, hearing loss. Non-auditory effects include physiological reactions such as a change in blood pressure or breathing rate, interference with sleep, adverse effects on human performance, and mental well being.

Generally, noise levels diminish with distance from the source of the noise. Some land uses are more sensitive to noise than others. Noise-sensitive land uses include residences, transient lodging, schools, hospitals, nursing homes, churches, meeting halls, and office buildings.

Monterey County Noise Regulations

The Proponent’s Proposed Project area is located in an unincorporated portion of Monterey County. The California Department of Health Services (CDHS) Office of Noise Control has established categories for judging the severity of noise impacts on specific land uses based on studies of noise levels and their effects. The Monterey County General Plan (1996) contains a Noise Element that establishes noise exposure standards for land use compatibility based on CDHS categories. According to these standards, shown in Table 4.8-1, normally acceptable exterior noise levels for residential areas are 50 to 60 decibels (day-night sound level [L_{dn}] or CNEL), although levels between 60 and 70 decibels are conditionally acceptable with appropriate noise insulation and other attenuation measures. Most of areas affected by project noise are isolated and would be passively used open space (Table 4.8-1).

Table 4.8-1: Monterey County Land Use Compatibility Standards for Exterior Community Noise[1]

Land Use Category	Noise Ranges (L_{dn} or CNEL) dBA			
	I	II	III	IV
Passively used open spaces	50	50–55	55–70	70+
Auditoriums, concert halls, amphitheaters	45–50	50–65	65–70	70+
Residential — low density single family, duplex, mobile homes	50–60	60–70	70–75	75+
Residential — multi family	50–60	60–70	70–75	75+
Transient lodging — motels, hotels	50–60	60–70	70–80	80+
Schools, libraries, churches, hospitals, nursing homes	50–60	60–70	70–80	80+
Actively used open spaces — playgrounds, neighborhood parks	50–67	–	67–3	73+
Golf courses, riding stables, water recreation, cemeteries	50–70	–	70–80	80+
Office buildings, business commercial and professional	50–67	67–75	75+	–
Industrial, manufacturing, utilities, agriculture	50–70	70–75	75+	–
Noise Range I — Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any building involved are of normal conventional construction without any special noise insulation requirements.				
Noise Range II — Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, which includes closed windows and conventional air supply systems or air conditioning, will normally suffice.				
Noise Range III — Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.				
Noise Range IV — Clearly Unacceptable: New construction or development should generally not be undertaken.				

Noise Sources in the Proponent's Proposed Project Area

The dominant source of noise in the Carmel Valley project area is traffic on Carmel Valley Road. Carmel Valley Road and San Clemente Drive represent the only access route to the Proponent's Proposed Project area at present. Typical peak noise levels due to passenger vehicles driving by on local streets are 55 to 65 dBA at 15 meters. Trucks, motorcycles, and poorly muffled automobiles produce noise levels 5 to 15 dBA higher.

Traffic noise is controlled by four major factors: speed, acceleration, road grade, and road surface. As speed, acceleration, and road grade increase, and as road surface worsens, vehicular noise levels would increase. Another consideration in highway noise is the escape of air between the tire treads as vehicles travel along the highways. Many four-wheel drive vehicles have large treads that produce excessive noise when traveling at high speeds.

Overflying aircraft can be heard at times in the Proponent's Proposed Project area, but are infrequent and not a significant noise source relative to traffic noise. Other sources of noise such as barking dogs, chain saws, and off-road vehicles are present in

[1] Monterey County General Plan, 1996

particular areas, but are not significant compared to noise produced by the transportation sources.

Sensitive Receptor Locations and Baseline Ambient Noise Levels

The Stone Cabin is listed as HR-8 in Section 4-10 Cultural Resources. It is located approximately 0.75 mile (3,960 feet, 1,207 meters) southwest of Site 4R at the closest point. The Stone Cabin is used as a remote recreational refuge by an ownership group of 10 individuals. The Jeep Trail (i.e., 4WD road) which serves the Stone Cabin would be improved to provide access above the Dam via Cachagua Road.

Additionally, in 1997, four residential locations nearest Proponent's Proposed Project activity areas were selected as representative sensitive noise receptors, as shown generally in Figure 4.8-1. Other nearby residential receptor locations not specifically evaluated would have similar or lesser project noise impacts. The four representative sensitive receptor locations are shown on the map as numbered below:

1. North bend in San Clemente Drive (Lot 11)
2. Residence off Center Court Place (Lot 10)
3. Residence above new intersection (Lot 9)
4. South end of San Clemente Drive (Lot 1)

In October 1997, ambient noise levels were monitored at the representative receptor locations. Existing noise levels recorded at each site are summarized in Table 4.8-2. Standard statistical noise descriptors were recorded at each receptor location. The L_{90} is the noise level exceeded 90 percent of the time, and is generally considered the background noise level. The L_{50} and L_1 are the noise levels exceed 50 percent and 1 percent of the time, respectively. The L_{eq} is the single noise level that has a noise energy equivalent to the overall varying noise monitored. The L_{dn} is the long-term average L_{eq}, with a night time "penalty" of 10 dBA, when noise levels are expected to be significantly lower. The L_{dn} was computed for each location using the field measurements, a standard model of hourly traffic distribution and an updated National Center for Highway Research traffic noise model.[2]

[2] Highway Research Board, 1971.

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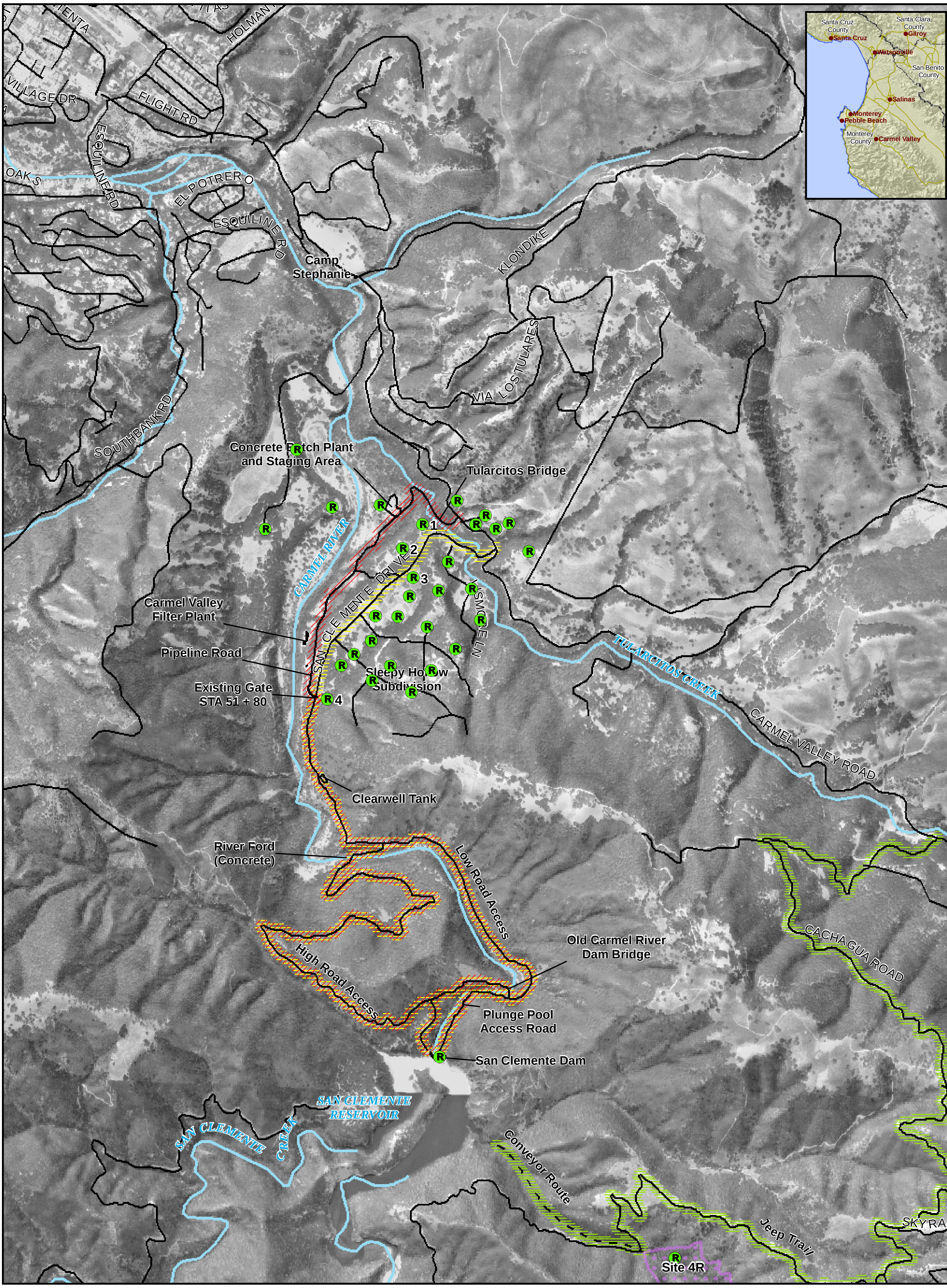

Legend

Access Routes
- Cachugua / 4R
- Sleepy Hollow
- Tularcitos
- Sleepy Hollow / Tularcitos*

*Note: Sleepy Hollow and Tularcitos access routes share the same roads between the filter plant and the dam

- Stream
- Existing Road
- Proposed Road
- Sediment Disposal Site
- Sensitive Receptor

1. North Bend in San Clemente Drive (Lot 11)
2. Residence off Center Court Place (Lot 10)
3. Residence above new intersection (Lot 9)
4. South end of San Clemente Drive (Lot 1)

Projection: California State Plane, Zone IV
Datum: NAD 83 Units: Feet

San Clemente Dam EIS/EIR

Figure 4.8-1

Sensitive Receptors Map

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Table 4.8-2: Baseline Ambient Noise (dBA)[3]

Receptor Location	L_{90}	L_{50}	L_{eq}	L_1	L_{dn}
1. North bend in San Clemente Drive (Lot 11)	37	39	46	56	49
2. Residence off Center Court Place (Lot 10)	36	38	47	56	47
3. Residence above new intersection (Lot 9)	37	41	51	60	51
4. South end of San Clemente Drive (Lot 1)	36	38	46	58	46
Adjacent to Carmel Valley Road (reference, not a receptor)	41	44	58	70	57

Ambient noise levels in 1997 reflected the traffic characteristics at each location: nearby traffic volume, average speed, and distance to the nearest road. In these locations background noise levels are established by natural sounds such as birds and wind in the trees, and by traffic on Carmel Valley Road. Since Carmel Valley Road is the only arterial with significant traffic (approximately 120 trips per hour), noise levels decrease with distance from this road. However, the "background" noise level (L90) reflected a generally quiet ambient noise level (37 dBA). The L_{dn} levels were within land use compatibility standards, with the highest levels found adjacent to Carmel Valley Road.

2030 Baseline Conditions

Since the Proponent's Proposed Project area is a sparsely populated rural zone with larger parcels of land occupied by individual residences with limited additional development potential, there would be no anticipated potential for significant changes in the ambient background noise summarized in Table 4.8-2. Therefore, the 1997 baseline ambient noise levels are not expected the change significantly in the future out to the year 2030.

4.8.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

In accordance with CEQA and County of Monterey land use compatibility standards for exterior community noise, a project impact would be significant if:

- Ambient noise levels in adjoining areas or in areas of sensitive receptors would increase substantially; or
- The proposed land uses are not compatible with ambient noise level standards.

Impact Assessment Methodology

The impact assessment utilizes estimates of project noise levels that are based on empirical calculations using literature-based noise source data and standardized calculations of noise attenuation with distance from the source. Since the complex nature of outdoor acoustics as affected by terrain and vegetation creates variability in

[3] The ambient noise levels computed fell in the "normally acceptable" range (Noise Range 1) of the Monterey County Land Use Compatibility Standards for residential uses.

noise levels at a given distance, the calculated noise levels associated with construction-related activities such as truck traffic and equipment operation may vary from those experienced during construction.

During the construction phase of the project, haul truck traffic noise level will vary depending on the quantities and frequency of trucks, which operate at any particular time. A maximum noise level for typical trucks in decibels (dBA) was correlated from industrial hygiene and noise measurement reference tables for characteristic industrial noise sources at reference distances.

Noise attenuation over distance from the alternative access roads was calculated on the basis of sound pressure level (SPL) converted to dB ("A" weighting, dBA). Sound pressure level (SPL, μbar, 0.1 N/m^2) attenuates with respect to the inverse distance law, where sound pressure is inversely proportional to the distance from the noise source. The decibel is defined as ten times the base 10 logarithm of the ratio between the two quantities of pressure squared, or:

$$SPL = 10 \log (p^2 / p_o^2) = 20 \log (p / p_o) \text{ dB}$$

where p is the sound pressure being measured and p_o is the reference sound pressure (in air 0.0002 μbar = 2×10^{-5} N/m^2, in water 0.00001 μbar = 1×10^{-6} N/m^2). This relationship is used to calculate attenuated noise levels for truck traffic at discrete distance intervals from the alternative access roads. Receptors range from about 60 to 600 meters in the receptor zone, with estimated attenuation shown in Table 4.8-3. At a sufficient distance from a particular noise source, with respect to intensity, noise becomes insignificant, particularly in complex, obstructed terrain covered with vegetation.

Table 4.8-3: Typical Noise Attenuation

Construction Equipment	Line-of-Sight Estimated Noise Level, dBA						
	15 m.	30 m.	60 m.	100 m.	150 m.	300 m.	600 m.
Dump Truck	91	85	79	75	71	65	59
Backhoe	85	79	73	69	65	59	53
Drilling Equipment Diesel Engines	100	94	88	84	80	74	68
Flatbed Truck	85	79	73	69	65	59	53
Pickup Truck	70	64	58	54	50	44	38
Tractor Trailer	85	79	73	69	65	59	53
Crane	85	79	73	69	65	59	53
Pumps	70	64	58	54	50	44	38
Welding Machine	72	66	60	56	52	46	40
City Street Traffic	80	74	68	64	60	54	48
Average for Truck Traffic	**87**	**81**	**75**	**71**	**67**	**61**	**55**

Table 4.8-4 shows that blasting noise at the dam site would not cause impacts due to the very long attenuation distance from the dam site to the receptor locations, 3900 to 5300 meters (see Figure 4.8-1). At these distances, transmitted noise would become insignificant, particularly in the complex obstructed terrain covered with vegetation.

Table 4.8-4: Typical Estimated Noise Impacts from Blasting

Activity	Line-of-Sight Estimated Noise Level, dBA						
	15 m.	1000 m.	2000 m.	3000 m.	4000 m.	5000 m.	6000 m.
Blasting (120 dBA)	120	84	78	74	71	70	68
Blasting (140 dBA)	140	104	98	94	91	90	88

In addition to the line-of-sight attenuation effects described above, the steep and convoluted terrain would cause construction noise to turn and bounce multiple times in order to reach a receptor. As noise turns or bounces in complex vegetated terrain, it is significantly reduced, typically 30 to 40 dBA.

Two aspects are important when considering potential noise impacts of a project: the increase in noise level, and the overall noise level produced. In terms of noise increases, persons exposed to an increase of 2 dBA or less would not notice the difference. Some persons exposed to increases of 3 to 4 dBA notice the increase in noise level, although the increase would not be serious. Noise increases of 5 dBA and above are very noticeable, and, if these are frequent incidents or continuous in nature, could represent a significant disturbance. Because of the existing low ambient levels in the Proponent's Proposed Project area, very noticeable short-term noise increases of 5 dBA or more could be produced by Proponent's Proposed Project activities.

4.8.3 IMPACTS AND MITIGATION

The following impacts have been defined for noise related activities:

- Issue NO-1: Dam Site Activities (noise from construction equipment and activity)
- Issue NO-2: Access Road Upgrades (noise generated during access road improvements)
- Issue NO-3: Project-Generated Traffic (noise from construction-related travel, including mobilization, materials, and workers)
- Issue NO-4: Concrete Batch Plant Operation (noise from operation of a new temporary stationary source)
- Issue NO-5: Sediment Disposal Site 4R Activities (noise from construction-related travel and activity)

Potential noise impacts associated with the seismic safety project would only occur during construction, would be intermittent and would not involve continuous noise sources, even during the primary construction period.

Proponent's Proposed Project

Impacts and mitigation measures for Noise Issue NO-5 (Sediment Disposal Site 4R Activities) do not apply to Proponent's Proposed Project.

Issue NO-1: Dam Site Activities

Noise from construction equipment and activity
Determination: ***significant, unavoidable, short-term***

IMPACT

Noise-generating activities associated with the Proponent's Proposed Project would cause temporary, short-term noise. Although most activities at the dam site would be audible and temporarily increase noise levels, they would not generate continuous noise. Because of their typically short duration, they would not affect the L_{dn} noise level.

The primary types of noise-generating construction activities that would occur in the area of the dam site include access road and bridge improvements; foundation preparation; parapet wall and spillway pier demolition; and concrete from construction and concrete pouring. These activities would involve the use of large diesel engine equipment, which produce noise levels of 75 to 85 dBA at 15 meters under full load. Jackhammers, if employed in the demolition phase, could produce noise levels of up to 90 dBA at 15 meters. A list of typical construction equipment and the associated noise levels is presented in Table 4.8-5, along with the "usage" level, or the portion of the time the equipment is generally used (that is, 0.4 means the equipment is used 40 percent of the time).[4]

No receptor areas would have a direct noise path and none are located in the vicinity of the Dam. Significant noise impacts would not occur due to the very long attenuation distance from the dam site to the receptor locations (3900 to 5300 meters; see Figure 4.8-1). At these distances, transmitted noise would likely become insignificant, particularly in complex terrain covered with vegetation. Residential noise levels in the Proponent's Proposed Project area, except for those adjacent to Carmel Valley Road, have existing L_{dn} noise levels below 50 dBA. Project noise sources of longer duration could temporarily increase the daily L_{dn}, but would rarely approach the 55 dBA limit considered acceptable for low-density residential use. Once the dam retrofit is complete, no long-term noise-generating activities would occur. However, given the sparsely populated rural nature of the area it cannot be determined with certainty that the impact will be less than significant.

MITIGATION

Standard measures such as limiting operations to normal daytime working hours to reduce noise nuisances would be routinely applied to construction activities near sensitive receptors and it is unlikely that dam site activities would have a significant noise impact. However, given the sparsely populated rural nature of the area it cannot be determined with certainty that the impact will be less than significant.

[4] U.S. EPA 1971

Table 4.8-5: Typical Ranges of Construction Equipment Noise Levels[5]

Equipment Type	Noise levels, dBA @ 15 m	Typical Usage
Mobile Equipment		
Front Loader	75–80	0.4
Backhoe	75–85	0.2
Bulldozer, tractors	75–85	0.4
Scraper	80–90	0.4
Grader	75–85	0.1
Truck	75–90	0.4
Paver	80–90	0.1
Materials Handling Equipment		
Concrete mixer	75–85	0.4
Concrete pump	75–80	0.4
Crane	75–85	0.2
Derrick	75–90	0.2
Stationary Equipment		
Pumps	70–75	1.0
Generators	75–80	1.0
Compressors	75–80	1.0
Saws	75–80	0.05
Impact Equipment		
Pile drivers	95–100	0.05
Jackhammers	75–90	0.1
Rock drills	80–100	0.05
Pneumatic tools	80–85	0.2

Issue NO-2: Access Road Upgrades

Noise generated during access road improvements
Determination: ***significant, unavoidable, short-term***

IMPACT

Road and bridge widening and improvement would generate noise transmitted from the following activities:

- Minor pruning and removal of some trees and underbrush. Gas engine chain saws typically produce sound levels of 82 to 87 dBA and would be used intermittently over a period of weeks.
- Delivery of aggregate materials and bridge building tasks. Diesel trucks produce noise levels of 80 to 85 dBA and would make several trips per day over a period of several months.
- Installing retaining walls along some embankments, by drilling holes and placing steel posts in concrete, to retain heavy wood timbers. This activity would require diesel equipment producing noise levels of 80 to 85 dBA for brief periods and would be completed within a few weeks.

[5] U.S. EPA 1971

- Widening and grading would require heavy machinery, such as small bulldozers, bobcats, backhoes, and diesel trucks. These have medium diesel engines and typically produce noise levels of 80 to 85 dBA under full load and 75 to 80 dBA while idling. This activity could occur sporadically at any particular location over a period of several months.

A summary of the typical intermittent conservative line-of-sight noise levels produced by road improvement activities at the representative receptors is presented in Table 4.8-6. Actual attenuated noise levels would likely be less than the calculated levels due to terrain and vegetation factors which would mitigate transmitted noise by approximately 3 to 7 dBA[6]. Resultant noise levels at some times at some locations may be above the normally acceptable range and/or more than 5 dBA above background. These instances would be transient and temporary. The noise exposures associated with road improvement would be very noticeable above the low background noise levels during several months of dam retrofit preparations. For comparison, a standard auto passby produces a maximum noise level of 55 to 65 dBA in the front yard of a residential property (15 meters). Thus, at some locations during road improvements, noise level increases could exceed that of a passing auto (or more than 5 dBA).

Table 4.8-6: Typical Estimated Road Improvement Noise

Receptor Location[7]	Estimated Noise Level, dBA
1. Lot 11 at north bend in San Clemente Drive (45 m)	60–70
2. Lot 10 residence off Center Court Place (60 m)	55–65
3. Lot 9 residence above new intersection (150 m)	55–65
4. Lot 1 at south end of San Clemente Drive (30 m)	70–80

Access roads and the OCRD Bridge could result in intermittent, short-term noise impacts for residential receptor areas shown in Figure 4.8-1 during daytime operations. Table 4.8-7 shows typical estimated attenuated noise levels at typical residential receptor distances from the prospective access routes (San Clemente Drive, Cachagua, Tularcitos) against a 37 dBA background (100 meters). The nearest receptor to an access route could receive about 75 dBA of equipment and traffic noise during daytime hours while the furthest receptor from an access route could receive about 55 dBA of equipment and traffic noise during daytime hours.

MITIGATION

Road construction and improvements would require contractor implementation of equipment maintenance and management practices to reduce construction-related noise. The following mitigation measures would be required to reduce this impact; however it may remain at a significant level for several weeks.

[6] Detailed terrain and vegetation attenuation analyses are beyond the scope of this study.
[7] The approximate distance to the road is in parentheses.

Table 4.8-7: Typical Estimated Short-term Intermittent Noise Impacts

Reference Level (15 meters)	Nearest Receptor (60 meters)	Furthest Receptor (600 meters)	Background Level (100 meters)
Attenuated noise level: 87 dBA	Attenuated noise level: 75 dBA	Attenuated noise level: 55 dBA	Attenuated noise level: 37 dBA

For off-road equipment:

- Use construction equipment that is of quiet design, has a high-quality muffler system, and is well maintained. This includes trucks used to haul materials. Examples of quiet-design construction equipment include the following:

    - For pile drivers: SPC Co. "Hush" models, Taywood Co. "Pilemaster" model, Dawson Co. "Quiet Piling Rig", for example.

    - For rock drills, mufflers have been developed by H.K. Porter and Acme Muffler. Both rock drill exhaust mufflers and body mufflers have been developed under contract to the U.S. Bureau of Mines Research Center. Pittsburgh Mining and Safety Research Center studies have shown that partial length constrained layer damping for drill steels is effective in reducing noise from drill bit vibration.

    - Install engine enclosure panels when required on stationary gas, diesel, or pump equipment.

    - Eliminate unnecessary idling of machines when not in use.

    - Use good maintenance and lubrication procedures to reduce operating noise.

    - Timing restrictions (i.e., daytime operations only) would be applied to construction activities in and near the concrete batch plant and staging site and access to and from this site from Carmel Valley Road via San Clemente Drive and Center Court Place.

For on-road vehicles:

- Passenger vehicle (including van pools) access for construction workers would be limited to between 7:00 a.m. and 7:00 p.m. Monday through Saturday during the construction season (typically April through October).

- Truck deliveries of construction material and equipment to the batch plant and from the batch plant to the Dam, and construction activities and equipment operation in and around the batch plant would be limited to between 8:00 a.m. and 6:00 p.m. Monday through Saturday during the construction season (typically April through October).

- Enforce California Vehicle Code prohibitions against faulty or modified loud vehicle exhaust systems (Sections 27150 and 27151).[8]
- Post low speed limits (15 mph as stated in the air quality section) on the unpaved access roads, not only to reduce noise levels and dust, but also to maintain safe operation conditions.

These mitigation measures would reduce the impacts of noise generated during access road improvements. Although the impacts will be transient and temporary, it is difficult to say with certainty that the mitigation measures will reduce the short-term impacts to less than significant.

Issue NO-3: Project-Generated Traffic

Noise from construction-related travel, including mobilization, materials, and workers
Determination: ***significant, unavoidable, short-term***

IMPACT

Typical project-generated traffic would be comprised of material delivery trucks, concrete-mixing trucks, and construction worker vehicles traveling to and from the site. Large diesel trucks would be employed to deliver aggregate, sand and concrete to the mixing plant site, as well as equipment to the dam site. These trucks have large diesel engines and produce noise levels of 75 to 80 dBA under full load and 70 to 75 dBA while idling (30 meters). An estimated 20 truck trips per day, with a maximum of about 4 trips per hour, would be expected under typical conditions.[9]

During dam construction, diesel concrete mixing trucks would pick up loads at the batch plant and deliver them to the dam site, creating noise levels of 70 to 80 dBA at 30 meters. Under peak conditions approximately 50 trips per day, or about 6 trips per hour, could travel the road.[10]

Construction worker vehicles traveling to and from the dam site include standard gas-engine cars, pickups and vans, producing noise levels of 55 to 65 dBA at 15 meters. The number of worker trips to and from the mixing plant or dam site is estimated to be about 90 per day, with about 25 to 30 in the morning and evening peak hours.[11]

Receptors for noise transmitted from project-generated car and truck trips to the dam site are described below for each route segment shown generally in Figure 4.8-1:

- On Carmel Valley Road to San Clemente Drive, receptors include several residential properties adjacent to the Carmel Valley Road.

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[8] Vehicles with poorly muffled unmuffled or modified engine or exhaust systems that cause excessive noise can be cited by any peace officer according to this code.
[9] Woodward-Clyde, October 1997 and Higgins & Associates, 1998, also MWH, 2005.
[10] Woodward-Clyde, October 1997 and Higgins & Associates, 1998.
[11] Woodward-Clyde, October 1997 and Higgins & Associates, 1998.

- On the Tularcitos Creek Access Route connection, receptors include residential properties on San Clemente Drive, particularly those near the entrance to Center Court Place.
- On the improved access road from new batch mixing plant location past filter plant, receptors include residential properties on San Clemente Drive, particularly those from the entrance to Center Court Place and Lot 1 at end of San Clemente Drive.
- On the improved access road from the extension of San Clemente Drive via the higher access road to the Dam, receptors include residential properties at the south end of San Clemente Drive.

Table 4.8-8 summarizes typical conservative line-of-sight noise levels due to various types of traffic on nearby properties at different sections of the access route. Actual attenuated noise levels would likely be less than the calculated levels due to terrain and vegetation factors which would mitigate transmitted noise by approximately 3 to 7 dBA[12]. Resultant noise levels at some times at some locations may be above the normally acceptable range and/or more than 5 dBA above background. These instances would be transient and temporary. Except for the receptors adjacent to Carmel Valley Road at road level, sensitive receptors would be protected not only by distance, but also by steep terrain and vegetation.

Table 4.8-8: Typical Estimated Project-Generated Traffic Noise

Receptor Location[13]	Worker Trips to the Dam (30/hr max), dBA	Truck Trips to Plant/Dam (6/hr max), dBA
1. Lot 11 at north bend in San Clemente Drive (45 m)	47–57	62–77
2. Lot 10 residence off Center Court Place (60 m)	40–50	60–75
3. Lot 9 residence above new intersection (30 m)	50–60	65–80
4. Lot 1 at south end of San Clemente Drive (30 m)	50–60	65–80

Since background levels are relatively low in the area away from Carmel Valley Road, new truck traffic passing the road several times per hour would be very noticeable, producing noise levels of up to 80 dBA at some receptors. Worker vehicles would be noticeable, but to a much lesser extent. For comparison, a standard auto passby would create a maximum noise level of 55 to 65 dBA in the front yard of a residential property, 15 meters from the road. In summary, most project-generated worker trips would produce lower noise levels than a typical auto passby due to lower speeds that would be required on the access roads during the course of the Proponent's Proposed Project. The noise produced by construction workers' vehicles would not cause a significant noise impact, however material delivery trucks and concrete mixing trucks would result in significant noise impacts.

[12] Detailed terrain and vegetation attenuation analyses are beyond the scope of this study.
[13] The approximate distance to project traffic is in parentheses.

MITIGATION

Mitigation for issue NO-2 (Access Road Upgrades) would also mitigate Impact NO-3 (Project-Generated Traffic). These mitigation measures would reduce the impacts of noise from construction related travel. Although the impacts would be transient and temporary, it is difficult to say with certainty that the mitigation measures can reduce the short-term impacts to less than significant.

Issue NO-4: Concrete Batch Plant Operation

Noise from operation of a new temporary stationary source
Determination: ***significant, unavoidable, short-term***

IMPACT

The concrete to be used for thickening and reinforcing SCD would be mixed at a small temporary batch plant to be constructed in an open area at the bend in the access road approximately a half mile northeast of the existing filter plant. Because of the proximity to at least two Sleepy Hollow properties, Proponent's Proposed Project activities occurring in the concrete mixing plant area potentially could cause construction noise disturbances. The activities occurring in the mixing plant area would be:

- Material loading into plant conveyors would involve the use of diesel engine loaders, producing short-term, intermittent noise levels of 70 to 80 dBA at 15 meters.

- Batch plant mixing operations would include various types of hoppers, conveyors, and motors to load and mix aggregate sand and cement. This stationary equipment produces noise levels to 70 to 78 dBA at 30 meters. This could be a relatively steady noise during days that concrete is being delivered to the site.

- Diesel trucks would deliver aggregate, sand and dry concrete to the mixing plant and also mixing trucks would deliver concrete to the dam site. The truck noise would occur several times per hour. (The noise impacts from trucks delivering materials to the plant and trucks delivering concrete to the Dam were considered in Issue NO-3.)

A summary of typical batch plant conservative line-of-sight noise levels at the affected receptor areas are presented in Table 4.8-9. Actual attenuated noise levels would likely be less than the calculated levels due to terrain and vegetation factors which would mitigate transmitted noise by approximately 3 to 7 dBA[14]. Resultant noise levels at some times at some locations may be above the normally acceptable range and/or more than 5 dBA above background, however, these instances would be significant and unavoidable would be short-term in nature.

[14] Detailed terrain and vegetation attenuation analyses are beyond the scope of this study.

Table 4.8-9: Typical Estimated Concrete Batch Plant Noise

Receptor Location[15]	Plant Noise, dBA
1. Lot 11 at north bend in San Clemente Drive (45 m)	55–60
2. Lot 10 residence off Center Court Place (60 m)	53–58
3. Lot 9 residence above new intersection (30 m)	Near Background
4. Lot 1 at south end of San Clemente Drive (30 m)	Near Background

The receptors that could be disturbed by plant noise would be limited to properties on San Clemente Drive that are within about 150 meters of the plant, a total of two lots. Both would be partly protected by terrain and vegetation attenuation, so there would be no actual direct noise transmission path (line-of-sight) between the plant and the property. Plant noise would often be audible above the ambient noise, but it would generally be low enough not to be considered intrusive. The analysis above shows that the resulting receptor noise levels when the plant is operating would fall within the Monterey County "Normally Acceptable" standard between 50 and 60 dBA for the closest locations, and would be lower at all other receptor locations.

Traffic and batch plant noise would not additively increase the severity of the impacts of either one alone. Since neither source of noise is steady and consistent, nor do the two have the same character or sound level, they would not be additive. Whichever noise is the loudest at the time or closest to a given receptor would be noticeable within the noise level ranges stated in this chapter.

MITIGATION

The batch plant would be quieted by the installation of sound damped conveyors and equipment enclosures, as well as fitting exhaust manifolds with high quality mufflers. Aggregate material piles at the batch plant site would be arranged to protect receptor locations. Wherever possible, materials would be piled to act as noise berms between residential locations and the truck and mixing plant noise sources.

- For the four sensitive receptor locations (Lots 1, 9, 10, and 11), periodically monitor noise generated by batch plant operation to determine actual noise levels and significance of impacts.

- The mitigation measures will minimize the short-term impacts associated with NO-4 (Concrete Batch Plant Operation) but it is difficult to say with certainty that the mitigation measures can reduce the short-term impacts to less than significant.

Alternative 1 (Dam Notching)

Impacts and mitigation measures for Noise Issues NO-2 (Access Road Upgrades), NO-3 (Project-Generated Traffic), and NO-4 (Concrete Batch Plant Operation) would be the same as the Proponent's Proposed Project.

[15] The approximate distance to the batch plant is in parentheses.

Issue NO-1: Dam Site Activities

Noise from construction equipment and activity
*Determination: **significant, unavoidable, short-term***

IMPACT

Impacts from dam notching and sediment disposal would be similar in most respects to those caused by the activities characterized for the Proponent's Proposed Project. Blasting may be used to break up large concrete pieces. At the dam site, blasting would cause brief intermittent noise impacts of a few seconds duration in the range of 120 to 140 dBA at 15 meters.[16,17]

MITIGATION

Noise generated at the Dam and sediment disposal sites, including blasting, would be attenuated by the very long distance to the receptor locations (3,900 to 5,300 meters) and by local terrain, as discussed above. Blasting would be restricted to daytime operations, between 8:00 a.m. and 6:00 p.m. Monday through Saturday during the construction season (typically April through October). The blasting schedule would be communicated to local residents.

Standard measures such as limiting operations to normal daytime working hours to reduce noise nuisances would be routinely applied to construction activities near sensitive receptors and it is unlikely that dam site activities would have a significant noise impact. However, given the sparsely populated rural nature of the area it cannot be determined with certainty that the impact will be less than significant.

Issue NO-5: Sediment Disposal Site 4R Activities

Noise from construction related travel and activity
*Determination: **significant, unavoidable, short-term***

IMPACT

The Stone Cabin is located approximately 0.75 miles (3,960 feet, 1,207 meters) southwest of Site 4R at the closest point. A 700 foot (213 meter) high ridge separates the Stone Cabin from Site 4R at the closest point. Thus, there is no direct line-of-sight from Site 4R to the Stone Cabin. Since there is no direct line-of-sight, noise from Site 4R would be deflected and attenuated by the interceding ridge. This spatial relationship would significantly reduce noise impacts on the Stone Cabin. As shown on the map, traffic on the improved Site 4R access road would not traverse the last mile (1,609 meters) of Jeep Trail beyond Site 4R.

Typical project-generated traffic noise at Site 4R would be comprised of trucks and equipment with large diesel engines and produce estimated noise levels of 75 to 85 dBA under full load and 70 to 80 dBA while idling (30 meters).

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[16] Barbara A. Plog, Ed. 1988. Fundamentals of Industrial Hygiene 3rd Edition. National Safety Council, Table 9-b, page 168

[17] Bruel & Kjaer, 1971, Acoustic Noise Measurements, Figure 2-10, page 20.

Table 4.8-10 shows typical estimated attenuated noise levels at the Stone Cabin from the proposed Site 4R activity against an estimated 40 dBA or less background[18].

Table 4.8-10: Typical Estimated Short-term, Intermittent Noise Impacts

Reference Level (15 meters)	Straight Line (1200 meters)	Complex Terrain (1200 meters)	Background Level (1200 meters)
Attenuated noise level: 87 dBA	Attenuated noise level: 49 dBA	Attenuated noise level: 34 dBA	Attenuated noise level: ≤40 dBA[19]

Impacts from transmitted noise from Site 4R to the Stone Cabin would become insignificant due to absorption by the complex terrain covered with vegetation which intercedes between Site 4R and the Stone Cabin. As shown in Table 4.8-10, the actual complex terrain attenuated noise transmission from Site 4R to the Stone Cabin is estimated to be 34 dBA compared to 49 dBA estimated for straight line attenuation. The estimated complex terrain attenuated value is less than estimated background at the Stone Cabin; however, given the sparsely populated rural nature of the area it cannot be determined with certainty that the impact will be less than significant.

MITIGATION

Standard measures such as limiting operations to normal daytime working hours to reduce noise nuisances would be routinely applied to construction activities near the Stone Cabin and it is unlikely that sediment disposal site activities would have a significant noise impact. However, given the sparsely populated rural nature of the area it cannot be determined with certainty that the impact will be less than significant.

Alternative 2 (Dam Removal)

Impacts and mitigation measures for Noise Issues NO-1 (Dam Site Activities), NO-2 (Access Road Upgrades) and NO-3 (Project-Generated Traffic) would be the same as the Proponent's Proposed Project. Issue NO-4 (Concrete Batch Plant Operation) would not apply. Issue NO-5 (Sediment Disposal Site 4R Activities) would be the same as Alternative 1.[20]

Alternative 3 (Carmel River Reroute and Dam Removal)

Impacts and mitigation measures for Noise Issues NO-1 (Dam Site Activities), NO-2 (Access Road Upgrades) and NO-3 (Project-Generated Traffic) would be the same as

[18] Barbara A. Plog, Ed. 1988. Fundamentals of Industrial Hygiene 3rd Edition. National Safety Council, Table 9-b, page 168

[19] Barbara A. Plog, Ed. 1988. Fundamentals of Industrial Hygiene 3rd Edition. National Safety Council, Table 9-b, page 168

[20] Noise generated at the Dam and sediment disposal sites, including blasting, would be attenuated by the very long distance to the receptor locations (3,900 to 5,300 meters) and by local terrain, as discussed above. Blasting would be restricted to daytime operations, between 8:00 a.m. and 6:00 p.m. Monday through Saturday during the construction season (typically April through October). The blasting schedule would be communicated to local residents.

the Proponent's Proposed Project. Issue NO-4 (Concrete Batch Plant Operation) and Issue NO-5 (Sediment Disposal Site 4R Activities) would not apply.[21]

Alternative 4 (No Project)

There are no construction activities associated with the No Project Alternative; therefore there would be no additional noise beyond baseline conditions.

[21] Noise generated at the Dam and sediment disposal sites, including blasting, would be attenuated by the very long distance to the receptor locations (3900 to 5300 meters) and by local terrain, as discussed above. Blasting would be restricted to daytime operations, between 8:00 a.m. and 6:00 p.m. Monday through Saturday during the construction season (typically April through October). The blasting schedule would be communicated to local residents.

4.9 TRAFFIC AND CIRCULATION

This section describes the potential impacts of the San Clemente Seismic Safety Project on the traffic and transportation related conditions in the Project Area. Traffic and transportation related conditions include regional and local roadways and existing traffic operating conditions influenced by the project. In the response to comments, additional information is provided in the Final EIR/EIS which clarifies and amplifies the information included in this Draft EIR/EIS. This environmental setting section was prepared using information developed from the documents provided by the RDEIR (Denise Duffy & Associates 2000).

4.9.1 ENVIRONMENTAL SETTING

This section describes the regional and local roadways that serve the project site and existing traffic operating conditions.

Existing Roadway System

San Clemente Drive

SCD is currently accessed from Carmel Valley Road via San Clemente Drive, a gated private road that extends from Carmel Valley Road through the Sleepy Hollow Subdivision. San Clemente Drive also provides access to the CVFP which is located adjacent to the Carmel River west of the Sleepy Hollow Subdivision. San Clemente Drive is a paved hard-surfaced road between Carmel Valley Road and a locked gate that prevents public access to the reservoir. From this locked gate on CAW property, San Clemente Drive is a one-lane unpaved roadway with turnouts to the junction of the upper and lower dam roads 3,100 feet south of the gate.

Carmel Valley Road

Carmel Valley Road extends between Highway 1 and Arroyo Seco Road west of Greenfield. It is a two-lane rural highway except for a four-lane divided section between Carmel Rancho Boulevard and Via Petra Way. Carmel Valley Road west of Laureles Grades has 12 foot travel lanes and shoulders minimally six feet in width. East of Laureles Grade, shoulder widths narrow. Through Carmel Valley Village, Carmel Valley Road is designed with twelve-foot travel lanes with two- to four-foot shoulders. Numerous driveways exist through the Village and the speed limit is 25 miles per hour.

East of Carmel Valley Village, the shoulder widths vary from two to eight feet. The road in certain areas is extremely winding. Near the project site, a speed limit is not posted, but prevailing vehicle speeds are generally less than 30 miles per hour. At the intersection with San Clemente Drive, one travel lane is provided in each direction on Carmel Valley Road and the travel lanes are approximately 12 feet in width. Striped shoulders are not provided on this section of Carmel Valley Road.

Cachagua Road

Cachagua Road is a two-lane rural road that traverses mountainous terrain with narrow pavement widths and minimal shoulders. It intersects Carmel Valley Road about 2 miles east of San Clemente Drive and it provides access to the Cachagua area of Monterey County. Cachagua Road is generally 18 to 20 feet wide, although there are sections that are not as wide.

A corner sight distance of approximately 400 feet is currently provided to the west from the Cachagua Road approach to Carmel Valley Road. The corner sight distance to the east at this location is about 225 feet. These measurements are taken from a driver's position on the Cachagua Road approach to Carmel Valley Road that is about 13 feet back from the edge of the eastbound travel lane. Corner sight distance measurements taken from a position closer to Carmel Valley Road would yield longer corner sight distance.

Vehicle speeds were observed on Carmel Valley Road at Cachagua Road and the prevailing speed is about 40 miles per hour in each direction. Based upon the stopping distance formula published by the American Association of State Highway and Transportation Officials (AASHTO 2007) a minimum corner sight distance of 295 feet looking west and 310 feet looking east should be provided at the Carmel Valley Road/Cachagua Road intersection. With a sight distance of approximately 225 feet provided to the east, the sight distance deficiency is approximately 85 feet. With an existing sight distance of approximately 400 feet looking to the west, the sight distance looking to the west from Cachagua Road is adequate.

State Route 1

SR 1 provides regional access and circulation functions in Monterey County. SR 1 is two lanes wide (1 lane each way) south of Ocean Avenue and 4 lanes wide north of Ocean Avenue. Traffic movements at the intersection of Highway 1 and Carmel Valley Road are controlled by a fully actuated traffic signal.

State Route 68

SR 68 can be accessed from Carmel Valley Road via Laureles Grade, a two-lane rural highway. SR 68 is a State highway connecting the Monterey Peninsula with Salinas and the Salinas Valley. It has a predominately east-west orientation. It is a four-lane freeway for the first one-half mile east of SR 1. Four travel lanes are also provided east of Toro Park. Two lanes are provided for approximately 10 miles between these four lane segments.

Laureles Grade

Between Carmel Valley Road and SR 68, Laureles Grade has a long, uphill grade in the northbound direction from Carmel Valley Road towards Highway 68. This is followed by a long downhill grade in the northbound direction on its approach to Highway 68.

Twelve-foot wide travel lanes and two- to six-foot wide shoulders are provided along Laureles Grade. The road is extremely winding along most of its length.

Jeep Trail

The Jeep Trail is an unimproved private dirt road that is used to access the San Clemente Open Space and an 18-acre privately owned parcel located off of Cachagua Road. The Open Space is owned and managed by the Monterey Peninsula Regional Park District (MPRPD) and is not currently open to visitors. The 18-acre parcel is used for recreational purposes by its owners. Access to the Jeep Trail is controlled by a locked Park District gate located near Cachagua Road. Therefore, current usage of the Jeep Trail by motor vehicles is low and not frequent.

Existing Traffic Volumes and Traffic Operations

Road Segment Daily Traffic Volumes and Level of Service

CARMEL VALLEY ROAD

Table 4.9-1 identifies existing daily traffic volumes and Level of Service for various segments of Carmel Valley Road and SR 1. The road segments subject to Carmel Valley Master policies are identified in Table 4.9-1 with a segment number between 1 and 12.

The Carmel Valley Master Plan divides Carmel Valley Road from Highway 1 through Carmel Valley Village into 10 segments. Three segments of Carmel Valley Road currently exceed threshold levels established in the Carmel Valley Master Plan. These segments are as follows:

Segment 3: Laureles — Ford	12,073 vpd	[1]LOS E
Segment 6: Schulte — Robinson	15,514 vpd	[1]LOS E
Segment 7: Rancho San Carlos — Schulte	17,012 vpd	[1]LOS E

Notes
[1]LOS=Level of Service

The other Carmel Valley Road segments that are subject to the policies of the Carmel Valley Master Plan operate at or better than the maximum level of service allowed by the Carmel Valley Master Plan.

CARMEL RANCHO BOULEVARD AND RIO ROAD

Carmel Rancho Boulevard and Rio Road (Segments 11 and 12) are also subject to the policies of the Carmel Valley Master Plan. These segments currently operate at LOS B.

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Table 4.9-1: Road Segment Volumes and Levels of Service

NO.	ROAD SEGMENT DESCRIPTION	LEVEL OF SERVICE THRESHOLD 24-HOUR VOLUME	LEVEL OF SERVICE THRESHOLD LOS	EXISTING VOLUMES ADT	EXISTING VOLUMES LOS	PROJECT TRAFFIC DISTRIBUTION	EXISTING PLUS PROPONENT'S PROPOSED PROJECT: PROPOSED PROJECT TRIPS	EXISTING PLUS PROPONENT'S PROPOSED PROJECT: TOTAL EXISTING + PROJECT VOLUMES	EXISTING PLUS PROPONENT'S PROPOSED PROJECT: LOS	EXISTING PLUS ALTERNATIVE 1: ALT 1 TRIPS	EXISTING PLUS ALTERNATIVE 1: TOTAL EXISTING + ALT 1 VOLUMES	EXISTING PLUS ALTERNATIVE 1: LOS	EXISTING PLUS ALTERNATIVE 2: ALT 2 TRIPS	EXISTING PLUS ALTERNATIVE 2: TOTAL EXISTING + ALT 2 VOLUMES	EXISTING PLUS ALTERNATIVE 2: LOS	EXISTING PLUS ALTERNATIVE 3: ALT 3 TRIPS	EXISTING PLUS ALTERNATIVE 3: TOTAL EXISTING + ALT 3 VOLUMES	EXISTING PLUS ALTERNATIVE 3: LOS	EXISTING PLUS NO PROJECT: NO PROJECT TRIPS	EXISTING PLUS NO PROJECT: TOTAL EXISTING + NO PROJECT VOLUMES	EXISTING PLUS NO PROJECT: LOS
A. CARMEL VALLEY ROAD																					
	East of Cachagua	N/A	N/A	2,100	B	5%	20	2,120	B	14	2,114	B	12	2,112	B	8	2,108	B	0	2,100	B
1.	Holman – Cachagua	8,487	D	4,208	D	95%	372	4,580	D	266	4,474	D	228	4,436	D	152	4,360	D	0	4,208	D
2a.	Esquiline – Holman	6,835	C	4,341	C	95%	372	4,713	C	266	4,607	C	228	4,569	C	152	4,493	C	0	4,341	C
2b.	Ford – Esquiline	N/A	D	8,984	D	90%	353	9,337	D	252	9,236	D	216	9,200	D	144	9,128	D	0	8,984	D
3.	Laureles – Ford	11,600	D	**12,073**	E	80%	314	**12,387**	E	224	**12,297**	E	192	**12,265**	E	128	**12,201**	E	0	**12,073**	E
5.	Robinson – Laureles	12,752	D	11,947	D	80%	314	12,261	D	224	12,171	D	192	12,139	D	128	12,075	D	0	0	11,947
6.	Schulte – Robinson	15,499	D	**15,514**	E	80%	314	**15,828**	E	224	**15,738**	E	192	**15,706**	E	128	**15,642**	E	0	**15,514**	E
7.	Rancho San Carlos – Schulte	16,340	D	**17,012**	E	78.5%	308	**17,320**	E	220	**17,232**	E	188	**17,200**	E	126	**17,138**	E	0	0	**17,012**
8.	Rio – Rancho San Carlos	48,487	C	21,892	A	75%	294	22,186	A	210	22,102	A	180	22,072	A	120	22,012	A	0	0	21,892
9.	Carmel Rancho – Rio	51,401	C	25,632	A	75%	294	25,926	A	210	25,842	A	180	25,812	A	120	25,752	A	0	0	25,632
10.	Highway – Carmel Rancho	27,839	E	24,404	E	70%	274	24,678	E	196	24,600	E	168	24,572	E	112	24,516	E	0	0	24,404
B. CARMEL RANCHO BOULEVARD																					
11.	Carmel Valley – Rio	33,495	C	10,901	B	2.5%	10	10,911	B	7	10,908	B	6	10,907	B	4	10,905	B	0	10,901	B
C. RIO ROAD																					
12.	**Carmel Rancho – Highway 1**	33,928	C	15,179	B	2.5%	10	15,189	B	7	15,186	B	6	15,185	B	4	15,183	B	0	15,179	B
D. SR 1																					
	North of Carmel Valley Rd	N/A	N/A	53,000	F	70%	274	53,274	F	196	53,196	F	168	53,168	F	112	53,112	F	0	53,000	F
	South of Carmel Valley Rd	N/A	N/A	30,000	F	2.5%	10	30,010	F	7	30,007	F	6	30,006	F	4	30,004	F	0	30,000	F
E. CACHAGUA ROAD																					
	Carmel Valley – Jeep Road	N/A	N/A	760	C	(See Note 5.)	0	760	C	266	1,026	C	228	988	C	152	912	C	0	760	C

NOTES:
LOS: Level of Service
ADT: Average Daily Traffic
N/A: Not applicable
Numbers in bold exceed Carmel Valley Road Master Plan threshold volume
Cachagua Rd Distribution:
Project = 0%
Alt 1 = 70%
Alt 2 = 100%
Alt 3 = 100%
No Project = 0%

STATE ROUTE 1

According to Caltrans statistics, SR 1 north of Carmel Valley Road carried 53,000 vehicles per day (vpd) and SR 1 south of Carmel Valley Road carried 30,000 vpd in 2004. Based on planning level of service threshold volumes, these links currently operate at LOS F.

SAN CLEMENTE DRIVE

San Clemente Drive currently carries an estimated 140 vehicles per day. Residential streets typically carry low volumes of traffic such that the traffic load does not meet or exceed the street capacity. Quality of life for residents is more important than street capacity in assessing impacts to residential streets.

Based on criteria provided in the literature, the following daily traffic volume thresholds provide a basis to assess the relationship between traffic volume and quality of life for residential streets:

Average Level of Service	Daily Traffic
A	1,200
B	1,400
C	1,600
D	1,800
E	2,000
F	>2,000

Currently, San Clemente Drive operates at the low end of LOS A.

CACHAGUA ROAD

The existing daily traffic volume and level of service for Cachagua Road are listed in Table 4.9-1. According to statistics published by Monterey County, Cachagua Road south of Carmel Valley Road carried an average of 760 per day in 2004 (MCDPWTE 2004). The segment between Carmel Valley Road and the Jeep Access Road currently operates at LOS C. Traffic volumes on Cachagua Road are relatively low and the LOS C operating condition is primarily due to the extended 11 percent grade extending in the southbound direction from Carmel Valley Road.

Intersection Traffic Volumes and Level of Service

CARMEL VALLEY ROAD/SAN CLEMENTE DRIVE

AM and PM peak period intersection turning movement counts were conducted at the Carmel Valley Road/San Clemente Drive intersection on Wednesday March 23, 2005. On this day, Carmel Valley Road west of San Clemente Drive carried 191 vehicles per hour (vph) during the AM peak hour and 205 vph during the PM peak hour. The existing AM and PM peak hour volumes were adjusted based on seasonal traffic volume statistics published by the Monterey County Public Works Department. The existing intersection volumes were increased by 9 percent to adjust the volumes to account for seasonal variations in traffic volumes. The adjusted existing AM and PM peak hour volumes are shown in Figure 4.9-1.

Based on technical procedures documented in the 2000 Highway Capacity Manual (HCM), the Carmel Valley Road/San Clemente Drive intersection currently operates at LOS A during both peak hours. The existing AM and PM peak hour intersection levels of service are summarized in Table 4.9-2.

CARMEL VALLEY ROAD/CACHAGUA ROAD

AM and PM peak period intersection turning movement counts were conducted at the Carmel Valley Road/Cachagua Road intersections on Thursday March 24, 2005. On these days, Carmel Valley Road west of San Clemente Drive carried 191 vehicles per hour (vph) during the AM peak hour and 205 vph during the PM peak hour. The existing AM and PM peak hour volumes were adjusted based on seasonal traffic volume statistics published by the Monterey County Public Works Department. The existing intersection volumes were increased by 9 percent to adjust the volumes to account for seasonal variations in traffic volumes. The adjusted existing AM and PM peak hour volumes are shown in Figure 4.9-1.

Based on technical procedures documented in the 2000 Highway Capacity Manual, the Carmel Valley Road/Cachagua Road intersection currently operates at LOS A during both peak hours. The existing AM and PM peak hour intersection levels of service are summarized in Table 4.9-2.

Figure 4.9-1: Existing AM and PM Peak Hour Intersection Volumes

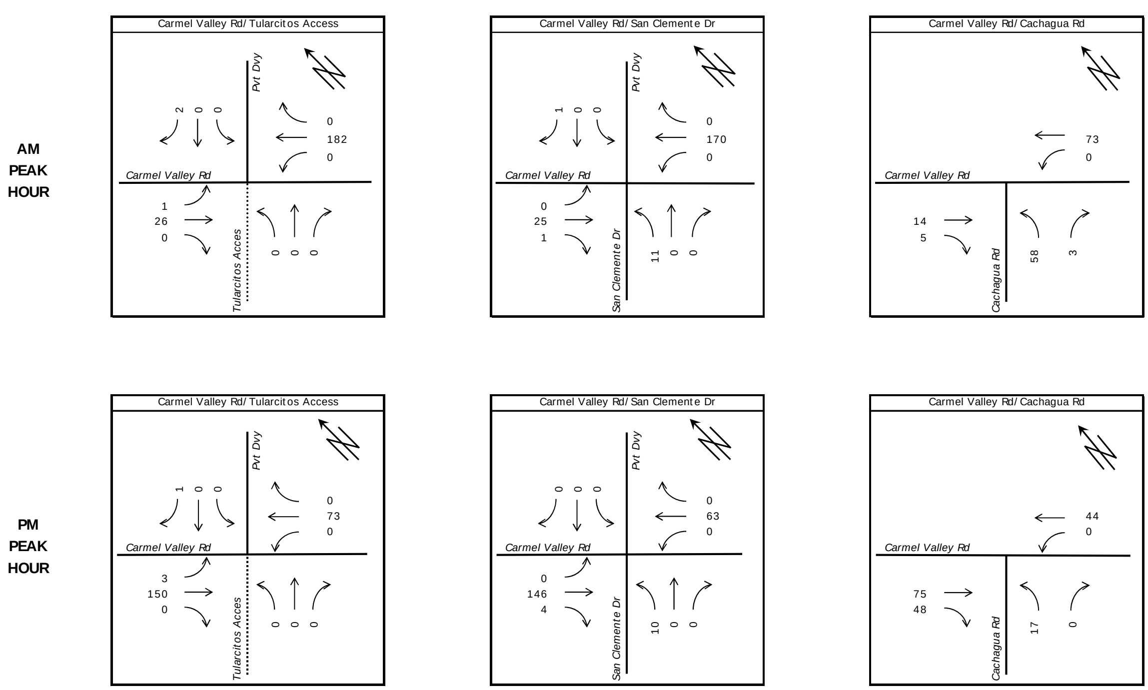


Table 4.9-2: Intersection Levels of Service

#	N-S Road	E-W Road	Existing Lane Configuration	Existing Intersection Control	LOS Standard	Existing Conditions				Existing Plus Proponent's Proposed Project				Existing Plus Alternative 1				Existing Plus Alternative 2				Existing Plus Alternative 3			
						AM Peak Hr		PM Peak Hr		AM Peak Hr		PM Peak Hr		AM Peak Hr		PM Peak Hr		AM Peak Hr		PM Peak Hr		AM Peak Hr		PM Peak Hr	
						Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
1	Private Dvwy/ Tularcitos Access Road (Future)	Carmel Valley Road	EB 1-L/T	Stop Sign (SB)	C	0.1	A	0.1	A	0.6	A	1.1	A	0.1	A	1.1	A	0.1	A	0.1	A	0.1	A	0.1	A
			WB 1-T/R	Northbound Approach		–	–	–	–	10.4	B	10.5	B	–	–	–	–	–	–	–	–	–	–	–	–
			SB 1-L/R	Southbound Approach		9.5	A	8.7	A	9.5	A	8.7	A	9.5	A	8.9	A	9.5	A	8.9	A	9.5	A	8.8	A
2	San Clemente Drive	Carmel Valley Road	EB 1-L/T/R	Stop Sign (NB & SB)	C	0.6	A	0.4	A	0.6	A	0.4	A	0.5	A	0.4	A	0.5	A	0.4	A	0.5	A	0.4	A
			WB 1-L/T/R	Northbound Approach		10.3	B	9.9	A	10.3	B	9.9	A	10.8	B	10.5	B	10.7	B	10.4	B	9.9	A	10.2	B
			SB 1-L/T/R	Southbound Approach		9.4	A	0.0	A	9.4	A	0.0	A	9.5	A	0.0	A	9.4	A	0.0	A	9.1	A	0.0	A
			NB 1-L/T/R									4.9	A												
3	Cachagua Road	Carmel Valley Road	EB 1-T/R	Stop Sign (NB)	C	3.7	A	0.9	A	3.7	A	0.9	A	3.4	A	2.3	A	3.3	A	2.2	A	3.4	A	1.6	A
			WB 1-L/T	Northbound Approach		9.3	A	9.4	A	9.3	A	9.5	A	9.6	A	9.8	A	9.5	A	9.8	A	9.4	A	9.6	A
			NB 1-L/R	Southbound Approach																					

NOTES:
1. L, T, R = Left, Through, Right
2. Nb, Sb, Eb, Wb = Northbound, Southbound, Eastbound, Westbound
3. Wa = Worst Approach
4. * = Delay Greater Than 300 Seconds
5. N/A = Not Applicable. With Recommended Improvement At This Intersection Under This Scenario, The Intersection Will No Longer Exist.

Accident Rates

CARMEL VALLEY ROAD

Table 4.9-3 provides a summary of traffic accidents that have occurred on Carmel Valley Road between 2002 and 2004. Accidents for 2004 are also summarized separately. For each road segment, accident rates are calculated as the number of accidents per million vehicle-miles of travel. Expected accident rates based on average statewide accident data compiled by Caltrans is also provided in Table 4-9.3.

Between 2002 and 2004, accident rates exceeded the statewide average for roadways of similar type on Carmel Valley Road between mileposts 5.70 and 6.26. Carmel Valley Road between mileposts 5.70 and 6.26 is the segment of road at the Mid-Valley Shopping Center. About one-half of these accidents occurred at the Doris Drive intersection. When the intersection related accidents at Doris Drive are removed from the calculation, the accident rate for the segment falls below the expected accident rate for the segment.

Accident rates in 2004 are similar to the 2002 to 2004 conditions. In 2004, the accident rate on the segment of Carmel Valley Road between the Mid-Valley Shopping Center and Laureles Grade exceeded the expected average accident rate for that segment.

CACHAGUA ROAD

Table 4.9-3 provides a summary of traffic accidents that have occurred on Cachagua Road between 2002 and 2004. Accidents for 2004 are also summarized separately. For each road segment, accident rates are calculated as the number of accidents per million vehicle-miles of travel. Expected accident rates based on average statewide accident data compiled by Caltrans are also provided in Table 4.9-3.

Table 4.9-3: Carmel Valley Road and Cachagua Road Accident Analysis

Begin Milepost		End Milepost	Road Type		Expected Accident Rate (Accidents Per MVM)	2002 - 2004: Jan 01 2002-Dec 31 2004 No. Collisions	2002 - 2004: 2002 - 2004 Average AADT	2002 - 2004: Time period (Years)	2002 - 2004: Jan 01 2002-Dec 31 2004 Collision Rate (Accidents Per MVM)	2004: Jan 01 2004-Dec 31 2004 No. Collisions	2004: 2004 AADT	2004: Time period (Years)	2004: Jan 01 2004-Dec 31 2004 Collision Rate (Accidents Per MVM)
CARMEL VALLEY RD													
0.00	-	0.55	4 Lanes Undivided	Suburban	2.55	13	24600	3	0.88	6	23600	1	1.27
0.55	-	1.72	4 Lanes Divided	Suburban	1.70	23	20700	3	0.87	10	24700	1	0.95
1.72	-	2.80	2 Lanes	Suburban	1.90	25	16833	3	1.26	10	19400	1	1.31
2.80	-	4.19	2 Lanes	Suburban	1.90	14	16833	3	0.55	7	17100	1	0.81
4.19	-	4.87	2 Lanes	Suburban	1.90	8	14633	3	0.73	3	17100	1	0.71
4.87	-	5.70	2 Lanes	Suburban	1.90	6	14633	3	0.45	0	14700	1	0.00
5.70	-	6.26	2 Lanes	Suburban	1.90	24	12067	3	**3.24**	10	14700	1	**3.33**
6.26	-	10.16	2 Lanes	Rural	1.33	59	11367	3	1.22	24	11400	1	**1.48**
10.16	-	11.49	2 Lanes	Suburban	2.95	38	11367	3	2.30	15	11100	1	2.78
11.49	-	12.00	2 Lanes	Urban	3.05	9	9267	3	1.74	2	11200	1	0.96
12.00	-	12.47	2 Lanes	Suburban	2.95	5	3767	3	2.58	0	8900	1	0.00
12.47	-	12.77	2 Lanes	Rural	1.76	1	3533	3	0.86	0	3500	1	0.00
12.77	-	14.12	2 Lanes	Rural	1.83	16	2270	3	**4.77**	7	3100	1	**4.58**
14.12	-	16.02	2 Lanes	Rural	1.84	15	2100	3	**3.43**	5	2100	1	**3.43**
Total Coll						256				99			
CACHAGUA RD													
0.00	-	3.00	2 Lanes	Rural	2.11	8	870	3	**2.80**	3	760	1	**3.60**

NOTES:

MVM: Million Vehicle Miles
Collision rates shown in bold exceed the expected accident rate based on state-wide accident history for similar type roads.

Between 2002 and 2004, accident rates exceeded the statewide average for roadways of similar type on Cachagua Road between Carmel Valley Road and the jJeep Trail. The poor horizontal alignment and narrow width of Cachagua Road are factors that contribute to the higher than expected accident rate on Cachagua Road.

4.9.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

In accordance with CEQA and professional standards, a project impact would normally be considered significant if the project would:

- Cause an increase in traffic that is substantial in relation to the existing traffic loads and capacity of the roadway system;
- Cause a substantial deterioration of the roadway surface as a result of construction activities;
- Substantially increase the traffic delay experienced by motorists;
- Substantially alter present patterns of circulation or movement; or
- Cause traffic hazards for pedestrians or operators of motor vehicles or bicycles.

The County of Monterey intersection and road segment significance criteria was used to evaluate impacts to traffic operations. The County of Monterey uses the following significance criteria to assess traffic-related impacts to pre-project traffic operations:

Controlled Intersections

A significant impact would occur if an intersection operating at LOS A, B, or C, degrades to D, E, and F. For intersections already operating at unacceptable levels D and E, a significant impact would occur if a project adds 0.01 or more to the critical movement's volume-to-capacity ratio. If the intersection is already operating at LOS F any increase (one vehicle) in the critical movement's volume-to-capacity ratio is considered significant.

Uncontrolled Intersections

A significant impact would occur if any traffic movement has LOS F or any traffic signal warrant is met.

Roadway Segments

A significant impact would occur if a roadway segment operating at A through E degrades to a lower level of service of D, E, or F. If a segment is already operating at LOS F any increase (one vehicle) is considered significant.

Residential Streets

Residential streets typically carry low volumes of traffic such that the traffic load does not meet or exceed the street capacity. Quality of life is more important than street capacity in assessing impacts to residents on residential streets.

Impact Assessment Methodology

Analytical procedures used for this study are described below.

Trip Generation

Daily and peak hour trips that would be generated by the construction project were estimated for the Proponent's Proposed Project and the project alternatives. The project would generate new vehicle trips related both to the hauling of workers and materials to the site and the volume of trips generated by the project would vary throughout the construction project according to variations in manpower requirements and material delivery schedules.

Trip generation estimates were prepared for each phase of the construction. The trip generation estimate for each construction phase represents the highest daily and peak hour trip generation expected during the construction phase. A description of the number of employees for each phase of the construction project is provided in Section 3.2. Project phasing and information regarding access road improvements is also provided in Section 3.2.

Table 4.9-1 shows the assignment of daily trips generated by the project to the study road segments as well as the existing plus project daily traffic volumes and level of service for various segments of Carmel Valley Road and SR 1. With project traffic added to the road network, the existing road segment levels of service are not changed. However, the project would add traffic to the SR 1 north and south of Carmel Valley Road, which currently operates at LOS F. The project would temporarily add traffic to the existing deficient section of SR 1 north and south of Carmel Valley Road.

PEAK HOUR TRIP GENERATION

The analysis of intersection operations is based on peak one-hour traffic volumes during the AM and PM commute periods. The AM and PM peak hour project trip assignment figures show the estimated volume of traffic that the project would add to the three study intersections during the AM and PM peak commute hours. The AM and PM peak hour project trip assignments were combined with existing intersection volumes to achieve total project condition volumes that were analyzed to determine project impacts.

The AM and PM peak hour trip generation estimates for the project were converted to "passenger car equivalent" (PCE) trips before being assigned to the road network. The truck generated trips were increased by a factor of four to reflect the greater impact that trucks have versus passenger cars.

Most of the traffic generated by the project is expected to arrive from and depart to the west. However, it is possible that some traffic may be oriented to and from the east. A trip distribution pattern of 95 percent to the west and 5 percent to the east was assumed for the project-generated traffic.

The Proponent's Proposed Project would generate 23 inbound PCE trips and 10 outbound PCE trips. The new Tularcitos Access Road would be constructed to provide access to the Dam for the Proponent's Proposed Project. Referring to Figure 4.9-2, the AM peak hour volumes on the exhibit are as follows:

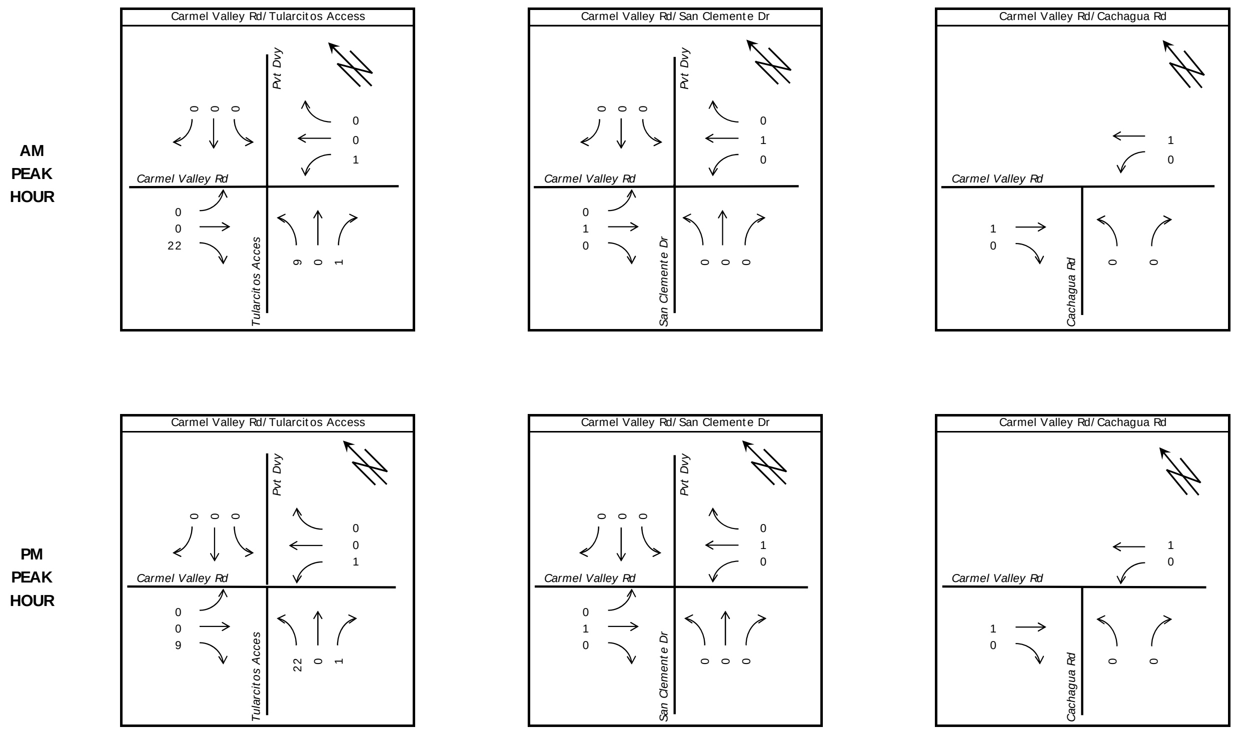
- 22 of the inbound trips are expected to arrive from the west and would make a right turn movement from eastbound Carmel Valley Road to the Tularcitos Access Road.
- One of the inbound trips is expected to arrive from the east and would make a left turn from westbound Carmel Valley Road to the Tularcitos Access Road.
- Nine of the outbound trips are expected to exit to the west and these trips would make a left turn from the Tularcitos Access Road to westbound Carmel Valley Road.
- One of the outbound trips is expected to exit to the east and this trip would make a right turn from the Tularcitos Access Road to westbound Carmel Valley Road.
- The one trip arriving from the east and the one trip departing to the east were modeled as through trips on Carmel Valley Road at the San Clemente Drive and the Cachagua Road intersections.

The trip generation during the PM peak hour is 10 inbound trips and 23 outbound trips. The trip assignment shown on Figure 4.9-2 is essentially a reverse of the AM peak hour trip assignment.

Daily Road Segment Volumes

Daily traffic volumes were estimated for Carmel Valley Road, Cachagua Road, Carmel Rancho Road, Rio Road and SR 1 for the Proponent's Proposed Project and the alternative projects and road segment levels of service were determined. The trip generation estimate for Phase 2 of the project was used in the analysis since it represents the maximum trip generation estimate for the project. A trip distribution pattern of 95 percent to the west and 5 percent to the east was assumed for the project, reflecting an expected predominant orientation of trips generated by the project to and from the west.

Figure 4.9-2: AM and PM Peak Hour Project Trip Assignment



NOTES:

Peak Hour Trip Generation reflects adjustment to account for the passenger car equivalents of large trucks

Intersection Operations

Project Condition (existing plus project) AM and PM peak hour traffic forecasts were prepared for the following intersections:

- Carmel Valley Road/Tularcitos Access Road;
- Carmel Valley Road/San Clemente Drive; and
- Carmel Valley Road/Cachagua Road.

Project Condition intersection operations were evaluated based on technical procedures documented in the 2000 Highway Capacity Manual (HCM).

Roadway Design

The adequacy of intersection and roadway geometrics at key access locations and routes were assessed using geometric design standards published by Caltrans, Monterey County and the AASHTO. The analysis included a review of intersection geometrics, left turn and right turn channelization warrants, roadway widths and sight distances.

Additional Levels of Delay

Motorists will tolerate additional levels of delay when traveling through a construction work zone. According to Caltrans policies, a significant traffic impact in a work zone is 30 minutes above normal recurring traffic delay on the existing facility or the delay threshold set by the District Traffic Manager, whichever is less. Applied in an urban environment, a queue of 2 to 3 miles on a freeway would result in a 30 minute delay. In a rural environment, such as the project location, motorists tolerate less delay. For this evaluation, a work zone delay greater than 10 minutes is considered a significant impact. This threshold is based upon the thresholds utilized by other state highway departments and engineering judgment. For example, the Indiana Department of Transportation work zone policy sets a maximum delay time of 10 minutes, the Maryland Department of Transportation uses an 8-minute delay threshold, the Massachusetts Highway Department uses a 12-minute delay threshold and the South Dakota Department of Transportation attempts to limit delay in work zones to 10 to 15 minutes.

2030 Baseline Conditions

Traffic volumes on the roadways serving the Project Area are expected to increase over time in relation to new development and increased economic activity including tourism. Traffic volumes on Carmel Valley Road through Carmel Valley have generally increased at an average annual rate of about 2 percent for the past 20 years. Traffic on SR 1 north and south of Carmel Valley Road has increased at an average annual rate of 2 percent to 3 percent for the past 20 years. If these growth rates continue into the future, traffic on the area roads would increase 40 to 60 percent from existing levels.

The San Clemente Dam Seismic Safety Project is expected to commence within three years. Because traffic-related impacts associated with project construction would occur in the near-term conditions are used to represent baseline conditions rather than 2030 volumes.

4.9.3 IMPACTS AND MITIGATION

The following impact issues have been defined for traffic and circulation:

TC-1: Road Segment Traffic Operations (additional traffic on area road network)

TC-2: Intersection Traffic Operations (changes to intersection level of service)

TC-3a: Traffic Safety Carmel Valley Road (increased accident rates)

TC-3b: Traffic Safety San Clemente Drive (increased accident rates)

TC-4: Inadequate Corner Sight Distances (adequate visual sight distance at intersections for stopping safety)

TC-5: New Intersections (effect on safety and traffic)

TC-6: Neighborhood Quality of Life (effect of increased traffic on residential neighborhoods)

TC-7: Pavement Loadings (effect of project traffic on pavement)

The traffic impacts of concern are associated with project construction. Of these, Traffic and Circulation Impact TC-6 would not apply, as residential roads would not be used for the Proponent's Proposed Project.

Proponent's Proposed Project

Issue TC-1: Road Segment Traffic Operations

Additional traffic on area road network
Determination: ***less than significant with mitigation, short-term***

IMPACT

The Proponent's Proposed Project would temporarily add construction-related traffic to the area road network Traffic generated by the proposed construction project would increase traffic volumes on Carmel Valley Road, Rio Road, Carmel Rancho Boulevard, SR 1 and San Clemente Drive.

The estimated number of daily and peak hour trips that would be generated by the construction project is summarized in Table 4.9-4. It is estimated that access improvements for the Proponent's Proposed Project would require 2,120 cubic yards of material. Delivered over a 35 day period in 18 cubic yard trucks would generate an average of 4 inbound loads per day, or 8 truck haul round trips per day. With the 15 employees on the site during Phase 1, total trip generation during Phase 1 would be 68 vehicle trips per day.

It was assumed that each employee on-site would generate four vehicle trips per day (two inbound trips and two outbound trips). This daily trip rate was used in the previous traffic studies for the project and accounts for deliveries of minor construction material, equipment, supplies, visitor trips and employee trips.

During Phase 2, a total of 16,408 tons of aggregate, cement, sand and other construction products would need to be imported to the project site. Delivered over an 80 day period at 25 tons per load, an average of 9 inbound loads per day, or 18 truck haul round trips per day would be generated during Phase 2. With a maximum of 80 employees on the site during Phase 2, total trip generation during Phase 2 would be 338 vehicle trips per day.

Table 4.9-4: Proponent's Proposed Project (Dam Thickening) Trip Generation

GENERATOR	DAILY TRAFFIC GENERATION	AM PEAK HOUR				PM PEAK HOUR			
		PEAK HOUR VOLUME	% OF DAILY	INBOUND	OUTBOUND	PEAK HOUR VOLUME	% OF DAILY	INBOUND	OUTBOUND
VEHICLE TRIPS									
VEHICLE TRIPS PHASE 1									
Employee Trips	60	17	28%	15	2	17	28%	2	15
Truck Trips	8	2	25%	1	1	2	25%	1	1
Total Trips	68	19	28%	16	3	19	28%	3	16
VEHICLE TRIPS PHASE 2									
Employee Trips	320	17	5%	15	2	17	5%	2	15
Truck Trips	18	4	22%	2	2	4	22%	2	2
Total Trips	338	21	6%	17	4	21	6%	4	17
PASSENGER CAR EQUIVALENCIES									
PCE's PHASE 1									
Employee Trips	60	17	28%	15	2	17	28%	2	15
Truck Trips	32	8	25%	4	4	8	25%	4	4
Total Trips	92	25	27%	19	6	25	27%	6	19
PCE's PHASE 2									
Employee Trips	320	17	5%	15	2	17	5%	2	15
Truck Trips	72	16	22%	8	8	16	22%	8	8
Total PCE's	392	33	8%	23	10	33	8%	10	23

NOTES:
PCEs = Passenger Car Equivalent

Under the Proponent's Proposed Project, the Jeep Trail would not be used for access to the Dam or to the reservoir. Therefore, the Proponent's Proposed Project would not impact the Jeep Trail.

Table 4.9-1 shows the assignment of daily trips generated by the project to the study road segments as well as the Existing plus Project daily traffic volumes and Level of Service for various segments of Carmel Valley Road and SR 1. With project traffic added to the road network, the existing road segment levels of service are not changed. However, the project would add traffic to the SR 1 north and south of Carmel Valley Road, which currently operates at LOS F. The project would temporarily add traffic to the existing deficient section of SR 1 north and south of Carmel Valley Road.

MITIGATION

By implementing the following measures, the impacts from additional traffic on area road network would be reduced to less than significant.

Trip Reduction Plan for Construction Workers

The Applicant will prepare a trip reduction plan that identifies measures that would be implemented to reduce the number of vehicle trips generated by construction workers. These measures would include a ride-sharing program using buses, and/or vanpools to reduce construction worker trips. The plan would establish an off-site park-and-ride area for project employees in Carmel Valley Village or another remote location and promote the use of carpools or vanpools to transport employees to the project site.

Traffic Coordination and Communication Plan

The Applicant will prepare a traffic coordination and communication plan that would define the specific schedules for truck delivery and worker shifts to avoid periods of peak commute traffic including school bus traffic on area roadways. Truck deliveries would be prohibited at night and weekends. Delivery of major items would be limited to weekdays between 8:00 AM and 3:00 PM. Mechanisms for informing the public of construction traffic schedules and activities would be included in the plan. This would include an on-site field office for the resident Traffic/Transportation Coordinator. The Traffic/Transportation Coordinator would be available to answer questions from the public regarding scheduled construction activities and major construction traffic schedules impacting residents.

Traffic Safety Plan

The Applicant will prepare a traffic safety plan that would address the appropriate vehicle size and speed; travel routes; flag person requirements; coordination with law enforcement and fire control agencies; emergency access to ensure child, pet and livestock safety; and the need for traffic and speed limit signs including advance warning and/or construction work zone signing on Carmel Valley Road. Elements of the Traffic Safety Plan are described in greater detail below.

Vehicle Size and Traffic Limitations

The types of vehicles that would be used during the construction project and the maximum speed limit for each vehicle would be defined.

Travel Routes

The main access route for access to and from the project site would be Tularcitos Access Road. San Clemente Drive would be used during the first year of construction of the Proponent's Proposed Project, while the Tularcitos Access Route is being developed. Mobilization and demobilization of construction equipment using San Clemente Drive are expected to occur over a period of several weeks and involve 15 to 30 trips with heavy equipment. Thereafter, 5 to 10 trips per day on San Clemente Drive will be used for worker, supervisor and maintenance access over a period of up to eight months during the first year of construction. Periodic delivery of materials during project construction would occur as well, by construction vehicles for initial mobilization of equipment at the beginning of the project for several weeks, an occasional truck during the project, and demobilization of equipment at the end of the project for several weeks.

Flag person Requirements

During periods when double-trailer trucks are used, flagging personnel would be posted to direct traffic at the Carmel Valley Road/Tularcitos Access Road intersection.

Emergency Agency/Access

An emergency Contact Sheet would be posted that lists 24-hour emergency contact numbers for law enforcement and fire control agency personnel, the owner, contractor, Traffic/Transportation Coordinator, resident project representatives, and the Monterey Bay Unified Air Pollution Control District. San Clemente Drive would be used for emergency access only.

Construction Signing and Striping

The Applicant will implement a County-approved traffic control plan during project construction. The limits of the traffic control plan would extend to Carmel Village and include additional traffic control devices including speed advisory signs, curve warning signs, delineators, reflectors and edge line markings on Carmel Valley Road.

Vehicle and Driver Inspection Program

The Applicant will prepare a vehicle and driver inspection program that would require that drivers involved in project construction be properly licensed and that the vehicle be in safe condition and properly registered and loaded. The program would include requirements for inspecting heavy equipment before it enters the project construction area. It would also entail coordination with law enforcement and other agencies. All drivers employed by the contractor and subcontractors would be properly licensed and their vehicles would comply with all applicable regulations and would be in safe condition and registered. Drivers would be required to contact the Project Field Office prior to accessing the project site. A representative of the contractor or the Traffic/ Transportation Coordinator would certify that the vehicles are in safe condition and are properly registered and loaded prior to allowing access to the site. Vehicles would be weighed after loading and before entering the project site. A driver log indicating the date, time driver name, driver license number, type of vehicle, vehicle weight and verification of vehicle registration would be maintained at the field office.

Traffic Impact Fee

The Applicant will pay a traffic impact fee to the County to be applied towards improvements to SR 1 and Carmel Valley Road. The County's traffic impact fee for Carmel Valley does not specifically apply to a construction project of this nature. Therefore, the impact fee would be based on residential dwelling unit equivalents associated with the traffic generated by the project.

Per the requirements of the County's Public Works Department, a Construction Management Plan (CMP) would be prepared during the final design stage of the project, and implemented prior to commencing with the project. The CMP would include a comprehensive traffic/transportation plan that would meet the following objectives:

- Reduce the number of vehicles (construction related and other) generated by the project;
- Reduce the interaction between construction equipment and other vehicles; and

- Promote public safety through actions aimed at driver and road safety.

The Traffic Safety Plan described above would form the basis of the County-required traffic/transportation plan which would be prepared after consultation and coordination with project engineers, affected agencies and community groups. The applicant will appoint a Traffic/Transportation Coordinator to direct the development and implementation of the plan. The County of Monterey Planning and Building Department would enforce implementation of the CMP.

Issue TC-2: Intersection Traffic Operations

Changes to intersection level of service
Determination: ***less than significant with mitigation, short-term***

IMPACT

An estimate of the volume of AM and PM peak hour trips that would be generated during the peak period of construction activity was prepared based upon the following assumptions:

- A vehicle occupancy ratio of 1:0 is assumed for the employees (i.e., all employees are assumed to drive alone).
- All employees arrive during the AM peak hour and depart during the PM peak hour.
- Inbound employee trips during the AM peak hour are assumed to represent 90 percent of the AM peak hour employee and miscellaneous trips and outbound employee trips during the PM peak hour are assumed to represent 90 percent of the total employee and miscellaneous PM peak hour trips.
- During Phase 1, one truckload of aggregate was assumed to arrive during the AM and PM peak hours and the empty trucks are assumed to depart during the same peak hours as well. During Phase 2, two truckloads of aggregate and construction material were assumed to arrive during the AM and PM peak hours and the empty trucks are assumed to depart during the same peak hours as well.

Based on these assumptions, the project would generate 19 trips during the Phase 1 AM and PM peak hours and 21 vehicle trips during the Phase 2 AM and PM peak hours.

For intersection capacity and channelization analyses, the peak hour truck trips generated by the project were converted to passenger car equivalent trips to account for the greater impact associated with each truck in the vehicle stream. Consistent with previous traffic analyses prepared for the project, four passenger car equivalents (PCEs) were assumed per truck (Transportation Research Board 1985). The project would generate 25 AM and PM peak hour passenger car-equivalent trips during Phase 1 and 33 AM and PM peak hour passenger car-equivalent trips during Phase 2.

Figure 4.9-2 shows the assignment of project generated AM and PM peak hour trips to the study intersections. The passenger car equivalent trip generation estimate figures for Phase 2 were used in this analysis and a trip distribution pattern of 95 percent to the west and 5 percent to the east was assumed. Most of the ingress and egress for the Proponent's Proposed Project would occur via the new Tularcitos Access once it is completed. However during CY 1, of the Proponent's Proposed Project, mobilization and demobilization of construction equipment using San Clemente Drive are expected to occur over a period of several weeks and involve 15 to 30 trips with heavy equipment. Thereafter, 5 to 10 trips per day on San Clemente Drive will be used for worker, supervisor and maintenance access over a period of up to eight months. Periodic delivery of materials during project construction would occur as well.

Project Condition AM and PM peak hour intersection volumes were achieved by combining the AM and PM peak hour traffic assignment for the project with the existing intersection volumes. The Project Condition AM and PM peak hour volumes are shown in Figure 4.9-3.

Project Condition AM and PM peak hour intersection levels of service are summarized in Table 4.9-2. With traffic from the Proponent's Proposed Project added to the study intersections, intersection levels of service are unchanged from existing conditions. However, the residents along San Clemente Drive may experience a short-term significant impact during AM and PM peak hours upon departure and return to their residents.

MITIGATION

Mitigation Measures would be the same as Issue TC-1 (Road Segment Traffic Operations) for the Proponent's Proposed Project. The described mitigation would reduce the impact to less than significant.

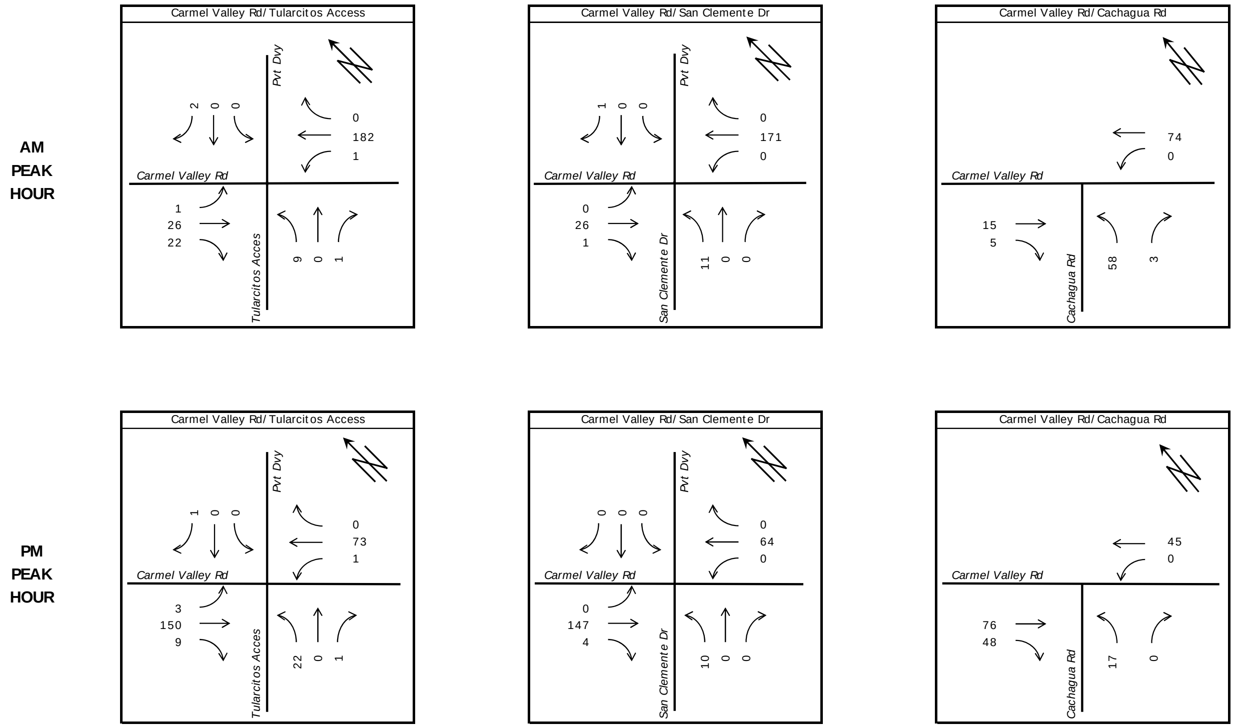
Issue TC-3a: Traffic Safety Carmel Valley Road

Increased accident rates
Determination: ***less than significant with mitigation, short-term***

IMPACT

The project would temporarily add construction traffic to the segment of Carmel Valley Road east of Carmel Village, which has poor horizontal alignments, minimal shoulder width and narrow travel lanes in some locations. This segment of Carmel Valley Road currently experiences relatively high accident rates. Research has shown that large trucks experience accidents at a higher rate than passenger vehicles. Therefore, the Proponent's Proposed Project could potentially increase accident rates on Carmel Valley Road.

Figure 4.9-3: Existing Plus Project AM and PM Peak Hour Intersection Volumes



MITIGATION

The accident rate on Carmel Valley Road east of Carmel Village currently exceeds expected accident rates for the roadway and it is recommended that mitigation be directed to this segment of Carmel Valley Road. Mitigation for impacts under Issue TC-1 (Road Segment Traffic) would also apply. In addition, the Applicant will work with the County Public Works Department to determine if funding additional enforcement on Carmel Valley Road throughout the period of the project when truck traffic would be generated by the Project is appropriate and reasonable in comparison to the potential impacts. The Applicant will subsequently pay additional funding for extra enforcement, which will monitor speeds and enforce truck inspections.

Issue TC-3b: Traffic Safety San Clemente Drive

Increased accident rates
Determination: ***significant, unavoidable, short-term***

Impact

The project would temporarily add construction traffic to San Clemente Drive which currently has minimal traffic as it resides between two locked gates. During the first year of construction of the Proponent's Proposed Project, site access will be developed. Mobilization and demobilization of construction equipment using San Clemente Drive are expected to occur over a period of several weeks and involve 15 to 30 trips with heavy equipment. Thereafter, 5 to 10 trips per day on San Clemente Drive will be used for worker, supervisor and maintenance access over a period of up to eight months during the first year of construction of the Tularcitos Access Road. Periodic delivery of materials would occur as well but it would not be considered significant. However, with only 140 vehicles per day using San Clemente Drive, any large vehicle traffic could be considered a significant and unavoidable impact to safety.

MITIGATION

Mitigation measures under Issue TC-1 (Road Segment Traffic) would be applied to minimize impacts under Issue TC-3b (Traffic Safety San Clemente Drive). However, even with the mitigation measures, it is not clear that the impacts would be reduced to less than significant levels.

Issue TC-4: Inadequate Corner Sight Distances

Adequate visual sight distance at intersections for stopping safety
Determination: ***less than significant, no mitigation required***

IMPACT

The corner sight distance from the location of the new access road looking to the west along Carmel Valley Road is approximately 300 feet and the sight distance from the location of the new access road to the east along Carmel Valley Road is approximately 350 feet. The recommended stopping sight distance for a 40-mile per hour design speed is 300 feet. Therefore, the proposed location of the Carmel Valley Road/new access road intersection would provide adequate stopping sight distance on Carmel Valley Road.

MITIGATION

Mitigation measures would not be required under the Proponent's Proposed Project.

Issue TC-5: New Intersections

Effect on safety and traffic
Determination: ***less than significant with mitigation, short-term***

IMPACT

Construction of the Tularcitos Access Road would add a new intersection on Carmel Valley Road. The intersection would be designed to meet Monterey County design standards MCPWG 2003). During periods of peak traffic demand during the construction project, the new intersection would operate at LOS A.

MITIGATION

Per Monterey County's required encroachment permit, the Applicant will design and construct a new intersection at Tularcitos Access and Carmel Valley Roads. The new intersection would be appropriately identified with advance warning and/or construction work zone signing on Carmel Valley Road. Analysis of the peak hour intersection operations indicates that left-turn channelization would not be required on the westbound Carmel Valley Road approach and a right turn lane would not be required on the eastbound Carmel Valley Road approach to the new Tularcitos Access Road. However, the Applicant will design and construct a right turn taper on the eastbound Carmel Valley Road approach to Tularcitos Access Road.

Issue TC-6: Neighborhood Quality of Life

Effect of increased traffic on residential neighborhoods
*Determination**: significant, unavoidable, short-term***

During the first year of construction of the Proponent's Proposed Project, site access will be developed. Mobilization and demobilization of construction equipment using San Clemente Drive are expected to occur over a period of several weeks and involve 15 to 30 trips with heavy equipment. Thereafter, 5 to 10 trips per day on San Clemente Drive will be used for worker, supervisor and maintenance access over a period of up to eight months during the first year of construction of the Tularcitos Access Road. The construction of the Tularcitos Access Route will occur during the initial phase of project work, before extensive work is done at the dam site. After Tularcitos construction, access to the project site would be provided via the Tularcitos Route, avoiding San Clemente Drive for most construction equipment and materials. These short-term, significant, unavoidable impacts would only occur during a portion of CY 1.

MITIGATION

Mitigation measures required under the Proponent's Proposed Project would be the measures implemented for TC-1 on San Clemente Drive. While these measures will minimize impacts, they would not reduce them to less than significant levels.

Issue TC-7: Pavement Loadings

Effect of project traffic on pavement
*Determination**: less than significant with mitigation, short-term***

The Proponent's Proposed Project would generate estimated 1,582-truck trips over the duration of the project. Over a 10-year design period, the project would generate an average of 0.61 truck trips per day, which would generate 2,101 equivalent single axle loads (ESALs). It is estimated that the segment of Carmel Valley Road near the project site is subject to the application of 76,824 ESALs over a 10-year time period based on the existing ADT of 2,230 vehicles per day and assuming 1 percent trucks on this segment of Carmel Valley Road. The existing truck loadings equate to a Traffic Index (TI) of 6.6. The TI is a measure of axle loadings that determines pavement structure requirements. With the project traffic loadings added to the existing ambient loadings, the total ESALs would increase to 78,925, which equates to a TI of 6.7. Because the TI changes with the additional loadings generated by the project, the project would have a significant impact to the pavement loadings on Carmel Valley Road east of Carmel Village.

MITIGATION

The Proponent's Project Proponent would repair any damage to Carmel Valley Road east of Carmel Village and restore it to its pre-project condition immediately after construction has been completed. In addition, the Applicant will coordinate with local agencies to determine whether the proposed routes for truck travel are appropriate before beginning construction.

Alternative 1 (Dam Notching)

Impacts and mitigation measures for Traffic and Circulation Issue TC-5 (New Intersections) would not apply to Alternative 1.

Impact TC-1: Road Segment Traffic Operations

Additional traffic on area road network
Determination: ***significant, unavoidable, short-term***

IMPACT

Alternative 1 would temporarily add construction-related traffic to the area road network. Traffic generated by the proposed construction project would increase traffic volumes on Carmel Valley Road, Rio Road, Carmel Rancho Boulevard, SR 1 and Cachagua Road.

The estimated number of daily and peak hour trips that would be generated by the Alternative 1 (Dam Notching) is summarized in Table 4.9-5. Trip generation estimates were prepared for each phase of the construction. The trip generation estimate for each construction phase represents the highest daily and peak hour trip generation expected during the construction phase. A description of the number of employees for each phase of the Alternative 1 construction project is provided in Section 3.3. Phasing and information regarding access road improvements is also provided in Section 3.3.

Under Alternative 1, the Jeep Trail from Cachagua Road to the disposal site, a distance of 1.5 miles, would be widened to 20-foot. A minimum width of 15 feet with turnouts for passing would be provided in tight reaches. The radius of curvature at sharper curves would be widened and a drainage ditch would be constructed on the uphill edge of the road. The surface would consist of 6 inches of Class II base rock and a double chip seal coat. A "Truck Crossing 500 Feet" sign would be installed on both Cachagua Grade approaches to the Jeep Trail. In addition, the Jeep Trail approach to Cachagua Road would be paved. It is estimated that access improvements for the Jeep Trail and the new road between the Jeep Trail and the Dam for Alternative 1 would require 4,250 cubic yards of material. Delivered over a 100-day period in 18 cubic yard trucks, an average of 5 inbound loads per day, or 10 truck haul round trips per day would be required to import the material for road improvements. With the 20 employees on the site during Phase 1, total trip generation during Phase 1 would be 90 vehicle trips per day.

Table 4.9-5: Alternative 1 (Dam Notching) Trip Generation

GENERATOR	DAILY TRAFFIC GENERATION	AM PEAK HOUR				PM PEAK HOUR			
		PEAK HOUR VOLUME	% OF DAILY	INBOUND	OUTBOUND	PEAK HOUR VOLUME	% OF DAILY	INBOUND	OUTBOUND
VEHICLE TRIPS									
VEHICLE TRIPS PHASE 1 (Year 1)									
Employee Trips	80	22	28%	20	2	22	28%	2	20
Truck Trips	10	2	20%	1	1	2	20%	1	1
Total Trips	90	24	27%	21	3	24	27%	3	21
VEHICLE TRIPS PHASE 2 - (Year 2)									
Employee Trips	180	26	14%	23	3	45	25%	22	23
Truck Trips	0	0	-	0	0	0	-	0	0
Total Trips	180	26	14%	23	3	45	25%	22	23
VEHICLE TRIPS PHASE 2 - (Year 3)									
Employee Trips	240	42	18%	38	4	60	25%	22	38
Truck Trips	10	2	20%	1	1	2	20%	1	1
Total Trips	250	44	18%	39	5	62	25%	23	39
PASSENGER CAR EQUIVALENCIES									
PCE's PHASE 1 (Year 1)									
Employee Trips	80	22	28%	20	2	22	28%	2	20
Truck Trips	40	8	20%	4	4	8	20%	4	4
Total Trips	120	30	25%	24	6	30	25%	6	24
PCE's PHASE 1 (Year 2)									
Employee Trips	180	26	14%	23	3	45	25%	22	23
Truck Trips	0	0	-	0	0	0	-	0	0
Total Trips	180	26	14%	23	3	45	25%	22	23
PCE's PHASE 2 (Year 3)									
Employee Trips	240	42	18%	38	4	60	25%	22	38
Truck Trips	40	8	20%	4	4	8	20%	4	4
Total PCE's	280	50	18%	42	8	68	24%	26	42

NOTES:
PCE's = Passenger Car Equivalent

Phase 2 would require two years to complete. The first year of Phase 2 would consist primarily of sediment transfer. Sediment transfer would be accomplished in two shifts. For the trip generation analysis, the 45 workers were split between the day and swing shift. On this basis, 180 trips would be generated per day during the first year of Phase 2.

Sediment transfer would continue during the second year of Phase 2. In addition, fish ladder and spillway overflow improvements would be constructed with the potential for this work to overlap with the sediment transfer operation. For the trip generation analysis, the 45 sediment transfer workers were split into two shifts and 15 additional workers were included in the day shift. Alternative 1 would require the import of 1,500 cubic yards of concrete, which would be accomplished near the end of the project, at a rate of 4 to 5 loads per day. For this analysis, it was assumed that these trips would overlap sediment transfer operations. On this basis, 250 trips would be generated per day during the second year of Phase 2.

Table 4.9-1 shows the assignment of Alternative 1 project daily trips to the study road segments and the road segment levels of service. Adding traffic generated by Alternative 1 to the road network, the existing road segment levels of service would not be changed. The impact significance to Carmel Valley Road and SR 1 would be the same as discussed for TC-1 (Road Segment Traffic) for the Proponent's Proposed Project, The additional trips added by Alternative 1 to Cachagua Road would not change the operating level of service for this facility.

Under Alternative 1, a new 0.5-mile access road (Conveyor Road) with a width of 25 feet and a 3 foot drainage ditch would be built from the disposal site to the reservoir. The excavated slope would be stabilized with anchors, wire mesh and shotcrete as needed. The surface would consist of 6 inches of Class II base rock with a double chip seal coat. Fifteen-inch diameter culverts with inlet structures would be installed at 400 foot intervals. The belt conveyor would be installed along the outside edge of the road.

The sediment disposal plan proposed in the Draft EIR/EIS would have intersected and cut off the Jeep Trail that leads to the Stone Cabin, denying access beyond the site during construction (two years). However, as discussed in Chapter 3, the disposal site (4R) has been moved uphill and a conveyor overcrossing would be provided to avoid any impact on access to the cabin via the Jeep Trail during construction.

With the exception of the narrower sections, two-way vehicular operations would be feasible on the improved Jeep Trail. The narrower sections would be limited to one-way vehicular operation. Turnouts would be provided where necessary to provide adequate traffic flow.

The Jeep Trail would be used for employee access and for the delivery of conveyor equipment and other construction equipment for Alternative 1. Improvements to the Jeep Trail would be made and the conveyor road would be constructed during the first construction season. Use of the Jeep Trail and conveyor road under Alternative 1 is estimated as follows:

- Project worker access during the construction season (all year during the first construction season and May to October during the following two seasons) through the Jeep Trail that leads by the Stone Cabin and then the conveyor road (once constructed).

- Mobilization of conveyor equipment during the first and third seasons, resulting in roughly 150 trips over 2 to 3 month for each mobilization.

- Mobilization of heavy earth moving and construction equipment (roughly 20 to 40 trips of large equipment) at the beginning and end of each construction season (May and October) for 3 seasons, averaging 2 to 3 loads per day for the first and last month of construction.

- Occasional (bi-weekly) mid-size equipment mobilization (e.g., equipment/supply trucks, cranes, backhoes, and small dozers).

During the peak construction activity, it is estimated that 250 vehicle trips per day would be generated by Alternative 1, most of which would travel on the Jeep Trail between Cachagua Road and the new reservoir access road/conveyor road. The level of construction traffic generated by the project would be relatively low and at levels that could be adequately served by the proposed road design. The 20-foot wide sections of the Jeep Trail would be adequate for two-way travel. The American Association of State Highway and Transportation Officials (AASHTO) publish design guidelines for low-volume local roads.[1] The minimum recommended width is 18 feet for a recreational road and 20 feet for a resource recovery road.

The one-lane, two-way segments located along the Jeep Trail would require additional traffic control measures, particularly where sight distance is constrained approaching the one-lane sections. Turnouts would be provided along the sections of the Jeep Trail that would be limited to one-way travel. This would enhance two-way traffic operations on the one-lane sections.

During the construction of the Jeep Trail improvements, non-project related traffic traveling on the Jeep Trail would be subjected to delays. As previously stated, the volume of traffic currently using the Jeep Trail is low. However, the Jeep Trail provides access to non-project related parcels in the area and construction activity on the trail would impact access to those parcels. Construction related delays would occur during the first construction season, primarily from May through August. At this time, it is not possible to precisely estimate the delay that non-project traffic would incur on the Jeep Trail during construction of improvements to the Jeep Trail. The amount of delay that a motorist on the Jeep Trail would experience during the road construction period would depend on the construction activity underway at the time the motorist arrives at the section under construction and the amount of time required by the construction crew to create a passable surface for the motorist. Because the amount of time that would be required to create a passable road surface is not known, the impact of the project during the construction of improvements to the Jeep Trail would be significant.

During mobilization periods, heavy earth moving equipment, construction equipment and the conveyor system would be transported by truck to and from the reservoir. The largest amount of truck trips would occur at the beginning of the construction season (May) and the end of the construction season (October). However, truck trips would be generated throughout the construction season. It is estimated that the peak truck generation would be 10 trips per day.

Traffic movements on the Jeep Trail would be controlled by flagmen when large trucks are transporting equipment to and from the project. Non-project traffic on the Jeep Trail

[1] *Guidelines for Geometric Design of Very Low-Volume Local roads (ADT<400)*, American Association of State Highway and Transportation Officials, 2001.

at the same time as the project generated truck traffic could incur periods of delay. To reduce the amount of delay that non-project traffic would experience, these vehicles could be positioned in turnouts or other wide sections of the jeep trial until the large truck passed. Under a worst-case condition, non-project traffic could be required to wait at either end of the 1.5 mile section of Jeep Trail that is being used by the project until the road was clear of the large trucks. The project would use 1.5 miles of the Jeep Trail and, assuming that a large truck would travel at an average speed of 10 miles per hour while traveling between the conveyor/reservoir access road and Cachagua Road, the motorist would experience 9 minutes of delay. This delay would be less than the 10 minute work zone delay threshold and, therefore, the delay would not be a significant impact.

It is not known at this time whether delays to non-project related users could be reduced to less than 10 minutes during the construction of improvements to the trail. Therefore, the impact of Alternative 1 to Jeep Trail users during road improvements would be significant and unavoidable. Impacts during the construction of improvements to the Jeep Trail could be reduced to less than significant levels if the Communication Plan includes procedures that allow the other users of the Jeep Trail to provide the construction contractor with a schedule for their use of the Jeep Trail. Construction activities could then be planned to minimize delays to the other users of the Jeep Trail.

MITIGATION

Mitigation for Issue TC-1 would be the same as described for the Proponent's Proposed Project. The Construction Management Plan would be expanded to include Cachagua Road and the Jeep Trail and would include the following additions:

- Cachagua Road would be the main access route for the Alternative 1 project.
- During periods when double-trailer trucks are used, flagging personnel would be posted to direct traffic at the Carmel Valley Road/Cachagua Road intersection.
- The traffic control plan would include Carmel Valley Road between Carmel Village and Cachagua Road, Cachagua Road and the Jeep Trail.
- Transport trucks would be escorted when traveling between Carmel Valley Road and the Jeep Trail. The escort vehicle would assist with traffic control during the ingress and egress movements. At some locations on Cachagua Road, it will be necessary to stop control opposing traffic movements during haul operations.

The Traffic Coordination and Communication Plan would include procedures for distributing the schedule of construction activities to the other users of the Jeep Trail. Procedures would be included in the Plan that would minimize the delay to non-project related Jeep Trail users during construction of improvements to the road as well as during subsequent project activities.

Issue TC-2: Intersection Traffic Operations

Changes to intersection level of service
Determination: ***less than significant, no mitigation required****.*

IMPACT

The total peak hour trip generation during Phase 1 would be 24 trips during the AM and PM peak hours. During the first year of Phase 2, 26 trips would be generated during the AM peak hour and 45 trips during the PM peak hour. During the second year of Phase 2, 44 trips would be generated during the AM peak hour and 62 trips during the PM peak hour.

Figure 4.9-4 shows the assignment of AM and PM peak hour trips generated by Alternative 1 to the study intersections. The passenger car equivalent trip generation estimates for year two of Phase 2 were used in this analysis. A trip distribution pattern of 95 percent to the west and 5 percent to the east was assumed for the project. The volume of project traffic using San Clemente Drive will vary throughout the project, but not projected to exceed 12 trips per day. Five percent of project traffic generated during the AM and PM peak hours was assigned to San Clemente Drive and 95 percent to Cachagua Road.

Alternative 1 AM and PM peak hour intersection volumes were achieved by combining the AM and PM peak hour traffic assignment for the project with the existing intersection volumes. The Alternative 1 AM and PM peak hour volumes are shown on Figure 4.9-5.

The Alternative 1 AM and PM peak hour intersection levels of service are summarized in Table 4.9-2. With traffic from Alternative 1 added to the study intersections, intersection levels of service would be unchanged from existing conditions.

Figure 4.9-4: AM and PM Peak Hour Alternative 1 Trip Assignment

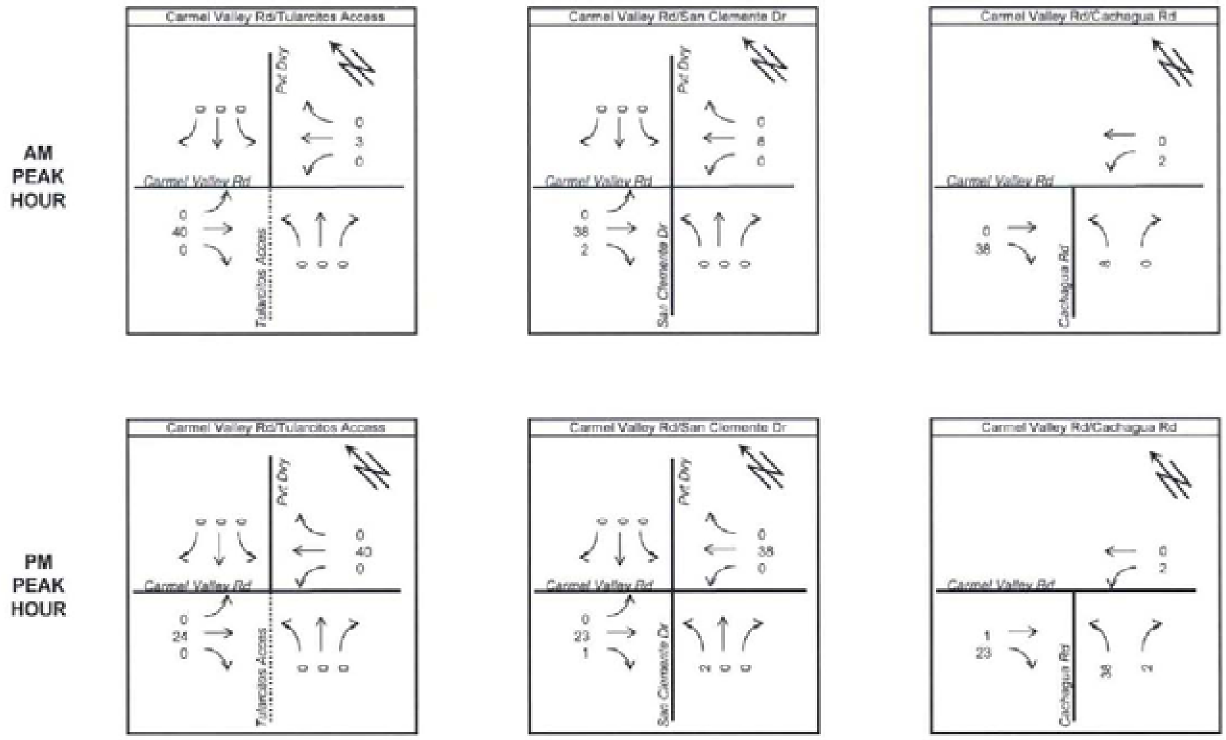
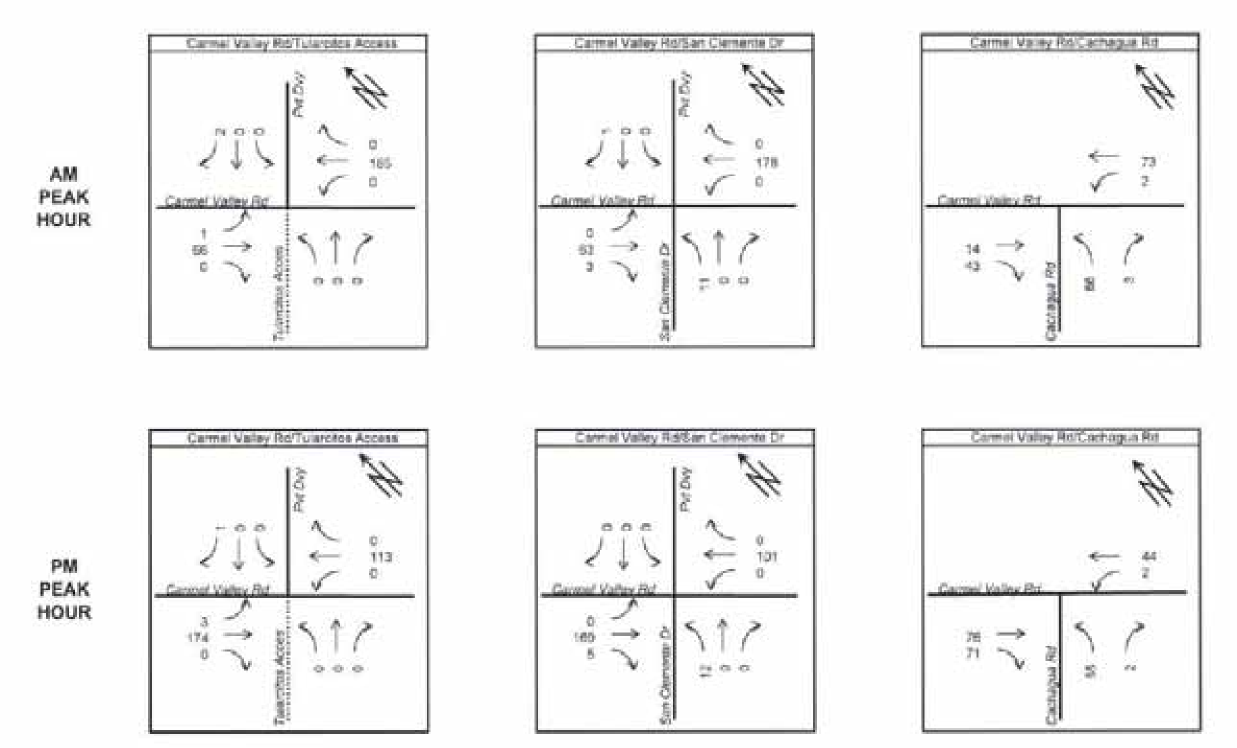


Figure 4.9-5: Existing Plus Alternative 1 AM and PM Peak Hour Intersection Volumes



Based on the forecasted traffic volumes with the addition of Alternative 1, channelization would not be required at the Camel Valley Road intersection with the Cachagua Road.

MITIGATION

Mitigation Measures would not be required under Alternative 1.

Issue TC-3a: Traffic Safety Carmel Valley Road

Increased accident rates
Determination: ***less than significant with mitigation, short-term***

The impact potential to Carmel Valley Road would be the same as discussed for Impact TC-3 for the Proponent’s Proposed Project. In addition, construction related traffic would be added to Carmel Valley Road up to Cachagua Road. This would extend the area of impact to these facilities.

Cachagua Road would be used to transport aggregate to the project site for improvements to dam access roads. This segment of Cachagua Road has poor horizontal alignments, minimal shoulder width and narrow travel lanes in some locations and an accident rate that exceeds the expected accident rate. Alternative 1 could potentially increase accident rates on Cachagua Road.

An analysis of the geometric alignment of Cachagua Road was performed to ensure that the transport trucks negotiate roadway. The AUTOTURN software program was used for this analysis. Figure 4.9-6 identifies locations with inadequate width to serve the turning requirements of the transport truck traveling south from Carmel Valley Road to the Jeep Trail. The locations shown on Figure 4.9-6 with inadequate geometrics require pavement widening to ensure that the transport trucks can turn without leaving the pavement. It should also be noted that the double trailer transport truck would encroach into the opposing travel lane for most of Cachagua Road given the horizontal alignment of the road.

MITIGATION

Mitigation for Issue TC-3 would be similar as described for the Proponent's Proposed Project. In addition, an improvement plan would be developed for Cachagua Road to widen the roadway providing additional pavement and ensuring haul truck turning requirements can be met.

Issue TC-3b: Traffic Safety San Clemente Drive

Increased accident rates
Determination: ***significant, unavoidable, short-term***

For Alternatives 1, 2 and 3 the Cachagua Access Route would be the primary route providing access above the Dam. However, San Clemente Drive would be needed to provide access below the Dam which is not accessible from the Chachagua route. San Clemente Drive would be used for initial mobilization of equipment for several weeks at the beginning of each construction year for three years, an occasional truck and workers during the project, and demobilization and equipment at the end of each construction year for a period of several weeks. The amount of trips during that several week period is expected to be 15 to 30 trips with heavy equipment. It is anticipated that less than 25 percent of the total construction traffic would use San Clemente Drive for access below the Dam. The number of trips added to San Clemente Drive is not projected to exceed 12 trips per day. San Clemente Drive is a narrow two-lane road with no facilities for pedestrians and bicyclists. The impact to pedestrian and bicycle circulation on San Clemente Drive would be a significant, unavoidable impact.

MITIGATION

Mitigation for impacts to traffic safety associated with San Clemente Drive would be the same as described for the Proponents.Proposed Project TC-1 (Road Segment Traffic).

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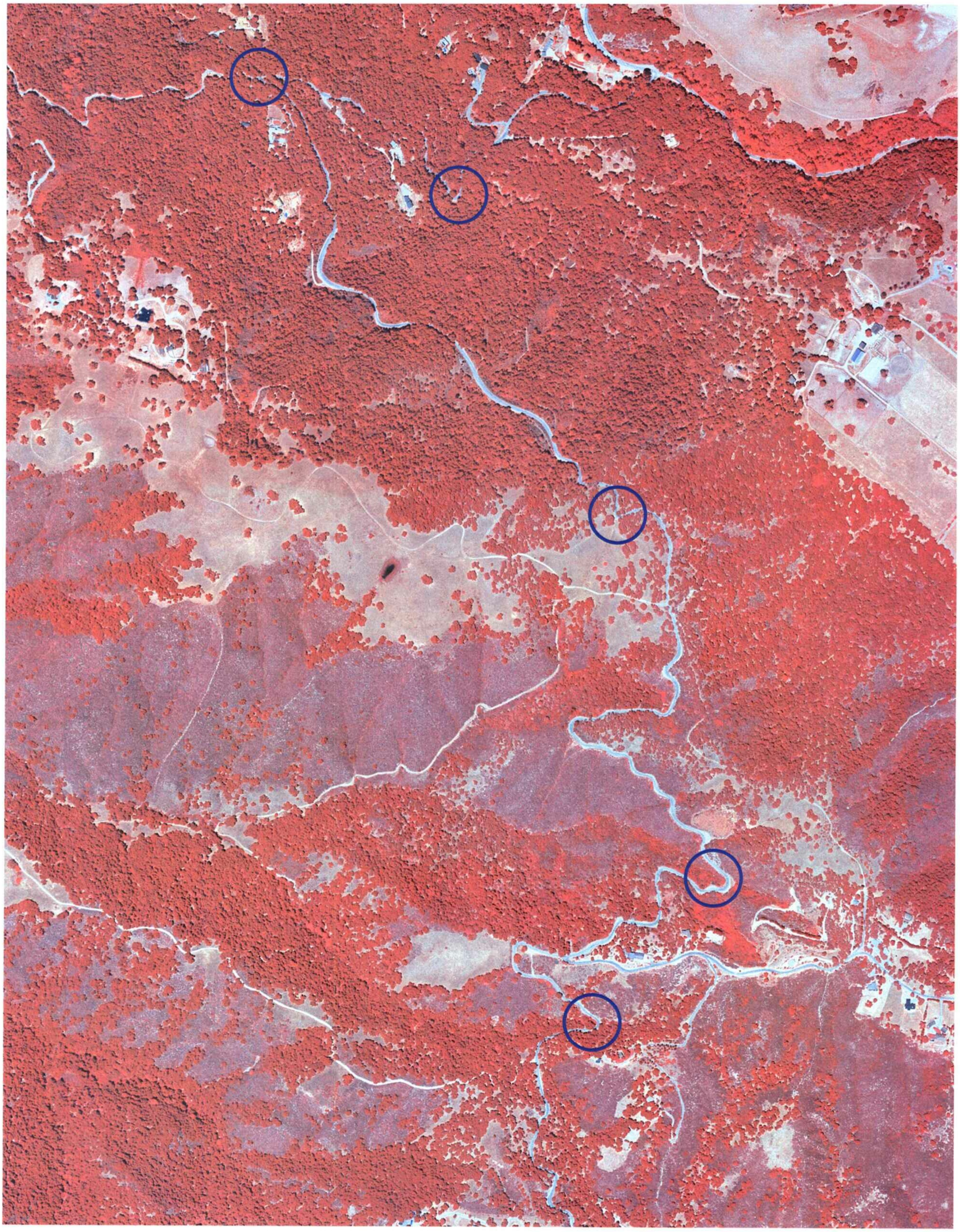
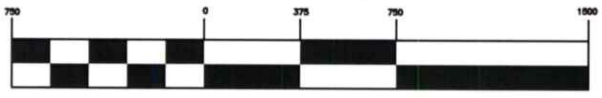
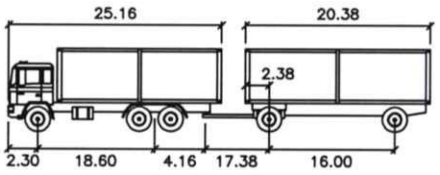


= LOCATIONS WITH INADEQUATE GEOMETRIC DESIGN TO SERVE THE TURNING REQUIREMENTS OF A TOWBAR TRAILER TRUCK.

GRAPHIC SCALE



(IN FEET)
1 inch = 750 ft.



Towbar Trailer Truck feet

First Unit Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.00	Steering Angle	: 40.00
First Unit Track	: 8.00	Articulating Angle	: 70.00
Trailer Track	: 8.00		

FIGURE 4.9-6
CACHAGUA ROAD
TRUCK TURNING
STUDY

HIGGINS ASSOCIATES

Issue TC-4: Inadequate Corner Sight Distances

Adequate visual sight distance at intersections for stopping safety
*Determination: **less than significant with mitigation, short-term***

IMPACT

The corner sight distance looking to the east from the Cachagua Road approach to Carmel Valley Road is currently not adequate. Alternative 1 would add trips to this intersection.

The corner sight distance looking to the north from the Jeep Trail approach to Cachagua Road is not adequate. The corner sight distance provided at the Cachagua Road intersection with the Jeep Trail is deficient looking to the north. The existing corner sight distance looking from the Jeep Trail to the north is 160 feet and the corner sight distance looking to the south is 350 feet. The sight distance looking to the south for a 35-mph design speed is adequate. A corner sight distance of 275 feet should be provided looking to the north.

MITIGATION

The Applicant will construct improvements at the Carmel Valley Road/Cachagua Road intersection to increase the sight distance provided for a motorist looking to the east from the Cachagua Road approach. The Applicant will also relocate the stop bar on the Cachagua Road approach to Carmel Valley Road to lengthen the sight distance looking to the east. In addition, physical improvements would be required at the intersection to provide further improvement to the sight distance. These include re-grading the embankment on the south side of Carmel Valley Road east of the Cachagua Road.

The Applicant will construct improvements at the Cachagua Road/Jeep Trail intersection to increase the sight distance provided for a motorist looking to the north from the Jeep Trail approach. The Applicant will improve the sight distance by either lowering the elevation of the embankment located on the east side of Cachagua Road north of the Jeep Trail or relocating the intersection of the Jeep Trail to increase the sight distance looking to the north.

Issue TC-6 Neighborhood Quality of Life

Effect of increased traffic on residential neighborhoods
*Determination: **significant, unavoidable, short-term***

IMPACT

Under Alternative 1 construction traffic would increase on to San Clemente Drive as described under Issue TC-3b and in Chapter 3.3. San Clemente Drive is a private street that serves a residential development and provides access below the Dam. Impacts under Issue TC-6 (Neighborhood Quality of Life) would be greater than under the Proponent’s Proposed Project, because San Clemente Drive would be used for mobilization and demobilization below the Dam and for occasional use during the project. Although San Clemente Drive would not be the primary access route for this Alternative (Cachagua Access Route would be the primary access route), it would be the only access route below the Dam (whereas under the Proponent's Proposed Project this function would be served by the Tularcitos Route). San Clemente Drive would be used for initial mobilization of 15 to 30 trips with heavy equipment at the beginning of the project for several weeks, an occasional truck and workers during the project, and demobilization of equipment at the end of the project for a period of several weeks each construction year for three years. It is anticipated that less than 25 percent of the total construction traffic would use San Clemente Drive for access below the Dam. The number of trips added to San Clemente Drive is not projected to exceed 12 trips per day.

San Clemente Drive would continue to operate at LOS A based on neighborhood quality of life level of service thresholds. However, any amount of truck traffic within the gated community of Sleepy Hollow may be considered significant impact to the quality of life of the residents.

Issue TC-6 (Neighborhood Quality of Life) on the Jeep Trail would be significant for the users of the Stone Cabin. The only traffic currently on the Jeep Trail is from the recreational users of the Stone Cabin. Therefore, the increase of traffic would be a significant impact to neighborhood quality of life.

MITIGATION

Mitigation measures under TC-1 would be implemented. However, mitigation measures would not reduce impacts to San Clemente Drive and the Jeep Trail to less than significant for Issue TC-6 (Neighborhood Quality of Life) under Alternative 1.

Issue TC-7: Pavement Loadings

Effect of project traffic on pavement
Determination: ***less than significant with mitigation, short-term***

IMPACT

Alternative 1 would generate an estimated 814 truck trips over the duration of the project. Over a 10-year design period, the project would generate an average of 0.31 truck trips per day, which would generate 1,078 equivalent single axle loads (ESALs). With the project traffic loadings added to the existing ambient loadings, the total ESALs would increase to 77,902, which equates to a Traffic Index (TI) of 6.6. The additional loadings would not change the existing TI.

Alternative 1 would add pavement loadings to Cachagua Road. It is estimated that Cachagua Road would be subject to the application of 26,182 ESALs over a 10-year time period based on the existing ADT of 760 vehicles per day and assuming 1 percent trucks on this segment of Cachagua Road. The existing truck loadings equate to a TI of 5.8. Adding the Alternative 1 traffic loadings to the existing ambient loadings, the total

ESALs would increase to 27,261, which equates to a TI of 5.9. The TI would change with the additional loadings generated by Alternative 1.

MITIGATION

Mitigation for Issue TC-7 would be the same as described for the Proponent's Proposed Project. Additionally, the Applicant will repair of any damage to Cachagua Road between Carmel Valley Road and the Jeep Trail and restore it to its pre-project condition immediately after construction has been completed.

Alternative 2 (Dam Removal)

Traffic and Circulation impacts and mitigation for Issues TC-3a: (Traffic Safety Carmel Valley Road), TC-3b: (Traffic Safety San Clemente Drive), TC-4 (Inadequate Corner Sight Distances) and TC-6 (Neighborhood Quality of Life) would be the same as discussed for Alternative 1 except they would increase from three construction seasons to four construction seasons. Issue TC-5 (New Intersections) would not apply to Alternative 2, as there are no new intersections.

Issue TC-1: Road Segment Traffic Operations

Additional traffic on area road network
Determination: ***significant, unavoidable, short-term***

IMPACT

The trip generation estimate for Alternative 2 (Dam Removal) is summarized in Table 4.9-6. A description of the number of employees for each phase of the Alternative 2 construction project is provided in Section 3.4. Phasing and information regarding access road improvements is also provided in Section 3.4.

Under Alternative 2, access improvements to the Jeep Trail as described above for Alternative 1 would be constructed. It is estimated that access improvements for Jeep Trail and the new road between the Jeep Trail and the Dam for Alternative 2 would require 4,250 cubic yards of material. Delivered over a 60 day period in 18 cubic yard trucks, an average of five inbound loads per day, or 10 truck haul round trips per day would be required to import the material for road improvements. With 15 employees on the site during Phase 1, total trip generation during Phase 1 would be 70 vehicle trips per day.

The sediment disposal plan proposed in the Draft EIR/EIS would have intersected and cut off the Jeep Trail that leads to the Stone Cabin, denying access beyond the site during construction (two years). However, as discussed in Chapter 3, the disposal site (4R) has been moved uphill and a conveyor overcrossing would be provided to avoid any impact on access to the cabin via the Jeep Trail during construction.

Table 4.9-6: Alternative 2 (Dam Removal) Trip Generation

GENERATOR	DAILY TRAFFIC GENERATION	AM PEAK HOUR PEAK HOUR VOLUME	AM % OF DAILY	AM INBOUND	AM OUTBOUND	PM PEAK HOUR PEAK HOUR VOLUME	PM % OF DAILY	PM INBOUND	PM OUTBOUND
VEHICLE TRIPS									
VEHICLE TRIPS PHASE 1 (Year 1)									
Employee Trips	60	17	28%	15	2	17	28%	2	15
Truck Trips	10	2	20%	1	1	2	20%	1	1
Total Trips	70	19	27%	16	3	19	27%	3	16
VEHICLE TRIPS PHASE 2 - (Year 2-4)									
Employee Trips	240	42	18%	38	4	61	25%	23	38
Truck Trips	0	0	-	0	0	0	-	0	0
Total Trips	240	42	18%	38	4	61	25%	23	38
PASSENGER CAR EQUIVALENCIES									
PCE's PHASE 1 (Year 1)									
Employee Trips	60	17	28%	15	2	17	28%	2	15
Truck Trips	40	8	20%	4	4	8	20%	4	4
Total Trips	100	25	25%	19	6	25	25%	6	19
PCE's PHASE 1 (Year 2-4)									
Employee Trips	240	42	18%	38	4	61	25%	23	38
Truck Trips	0	0	-	0	0	0	-	0	0
Total Trips	240	42	18%	38	4	61	25%	23	38

NOTES:
PCE's = Passenger Car Equivalent

Phase 2 would require three years to complete, which would primarily consist of sediment transfer operations. Sediment transfer would be accomplished in two shifts. For the trip generation analysis, 45 workers were split between the day and swing shift for sediment transfer. An additional 15 workers were assigned to the day shift. On this basis, 240 trips would be generated per day during Phase 2.

Table 4.9-1 shows the assignment of Alternative 2 project daily trips to the study road segments and the road segment levels of service. With Alternative 2 traffic added to the road network, the existing road segment levels of service would not be changed.

Use of the Jeep Trail and conveyor road under Alternative 2 is estimated as follows:

- Project worker access during construction (all year during the first construction season and May to October during the following two seasons) on the Jeep Trail that passes by the Stone Cabin and then to the conveyor road (once constructed).
- Mobilization of conveyor equipment during the first and fourth seasons, resulting in roughly 150 trips over 2 to 3 month for each mobilization.
- Mobilization of heavy earth moving and construction equipment (roughly 20 to 40 trips of large equipment) at the beginning and end of each construction season (May and October) for 4 seasons, averaging 2 to 3 loads per day for the first and last month of construction.

- Occasional (bi-weekly) mid-size equipment mobilization (e.g., equipment/supply trucks, cranes, backhoes, and small dozers).

The Jeep Trail would be used for employee access throughout the construction period and for the delivery of conveyor equipment and other construction equipment. During the peak construction activity, it is estimated that 240 vehicle trips per day would be generated by Alternative 2. Most of the vehicles would travel on the Jeep Trail between Cachagua Road and the new reservoir access road/conveyor road. The 20-foot wide sections of the Jeep Trail would be adequate for two-way travel. Turnouts would be provided along the sections of the Jeep Trail that would be limited to one-way travel to enhance two-way operations.

As in Alternative 1, non-project related traffic using the Jeep Trail would be subjected to delays during the construction of improvements to the Jeep Trail. As additionally described for Alternative 1, the impact of the project during the construction of improvements to the Jeep Trail would be significant because it is not known if the amount of delay that a motorist would experience during the road construction period would be less than 10 minutes.

Similarly to Alternative 1, during mobilization periods, heavy earth moving equipment, construction equipment and the conveyor system would be transported by truck to and from the reservoir. Traffic movements on the Jeep Trail would be controlled by flagmen when large trucks are transporting equipment to and from the project. The delay experienced by non-project traffic would be less than 10 minutes and, therefore, the delay would not be a significant impact under Alternative 2.

As in Alternative 1, a Construction Management Plan would be developed for the Jeep Trail that includes a Trip Reduction Plan for Construction Workers, Traffic Coordination and Communication Plan and a Safety Plan for Alternative 2. The CMP would include measures to minimize the delay to non-project related Jeep Trail users during construction of improvements to the road and during subsequent project activities. It is not known whether delays to non-project related users could be reduced to less than 10 minutes during the construction of improvements to the trail during road improvements. Therefore, the impact of Alternative 2 to Jeep Trail users would be significant and unavoidable. Impacts during the construction of improvements to the Jeep Trail could be reduced to less than significant levels if the Communication Plan includes procedures that allow the other users of the Jeep Trail to provide the construction contractor with a schedule for their use of the Jeep Trail. Construction activities could then be planned to minimize delays to the other users of the Jeep Trail.

MITIGATION

Mitigation would be the same as described for Alternative 1.

Issue TC-2: Intersection Traffic Operations

Changes to intersection level of service
Determination: ***less than significant, no mitigation required***

IMPACT

The peak hour trip generation during Phase 1 of Alternative 2 would 19 trips during the AM and PM peak hours. The peak hour trip generation during Phase 2 of Alternative 2 would be 42 trips during the AM peak hour and 61 trips during the PM peak hour.

Figure 4.9-7 shows the assignment of AM and PM peak hour trips generated by the Alternative 2 project to the study intersection. The passenger car equivalent trip generation estimate figures for year two of Phase 2 were used in this analysis. A trip distribution pattern of 95 percent to the west and 5 percent to the east was assumed for the project. Five percent of the peak hour traffic was assigned to San Clemente Drive and 95 percent was assigned to Cachagua Road.

Alternative 2 AM and PM peak hour intersection volumes were achieved by combining the AM and PM peak hour traffic assignment for the project with the existing intersection volumes. The Alternative 2 AM and PM peak hour volumes are shown on Figure 4.9-8.

The Alternative 2 AM and PM peak hour intersection levels of service are summarized in Table 4.9-2. With traffic from Alternative 2 Project added to the study intersections, intersection levels of service would be unchanged from existing conditions. Based on the Existing Plus Alternative 2 traffic volume forecasts, left turn and right turn channelization would not be required at the Camel Valley Road intersection with the Cachagua Road.

MITIGATION

Mitigation measures for Issue TC-2 would not be required under Alternative 2.

Issue TC-7: Pavement Loadings

Effect of project traffic on pavement
Determination: ***less than significant with mitigation, short-term***

IMPACT

Alternative 2 would generate an estimated 544 truck trips over the duration of the project. Over a 10-year design period, the project would generate an average of 0.21 truck trips per day, which would generate 720 equivalent single axle loads (ESALs). With the Alternative 2 traffic loadings added to the existing ambient loadings on Carmel Valley Road, the total ESALs would increase to 72,032, which equates to a TI of 6.6. The TI would not change with the additional loadings generated by Alternative 2.

It is estimated that Cachagua Road is subject to the application of 26,182 ESALs over a 10-year period based on the existing ADT of 760 vehicles per day and assuming 1 percent trucks on this segment of Cachagua Road. The existing truck loadings equate to a Traffic Index (TI) of 5.8. With the Alternative 2 traffic loadings added to the existing ambient loadings, the total ESALs would increase to 26,903, which equates to a TI of 5.9. The TI would change with the additional loadings generated by the Alternative 2.

Figure 4.9-7: AM and PM Alternative 2 (Dam Notching) Trip Assignment

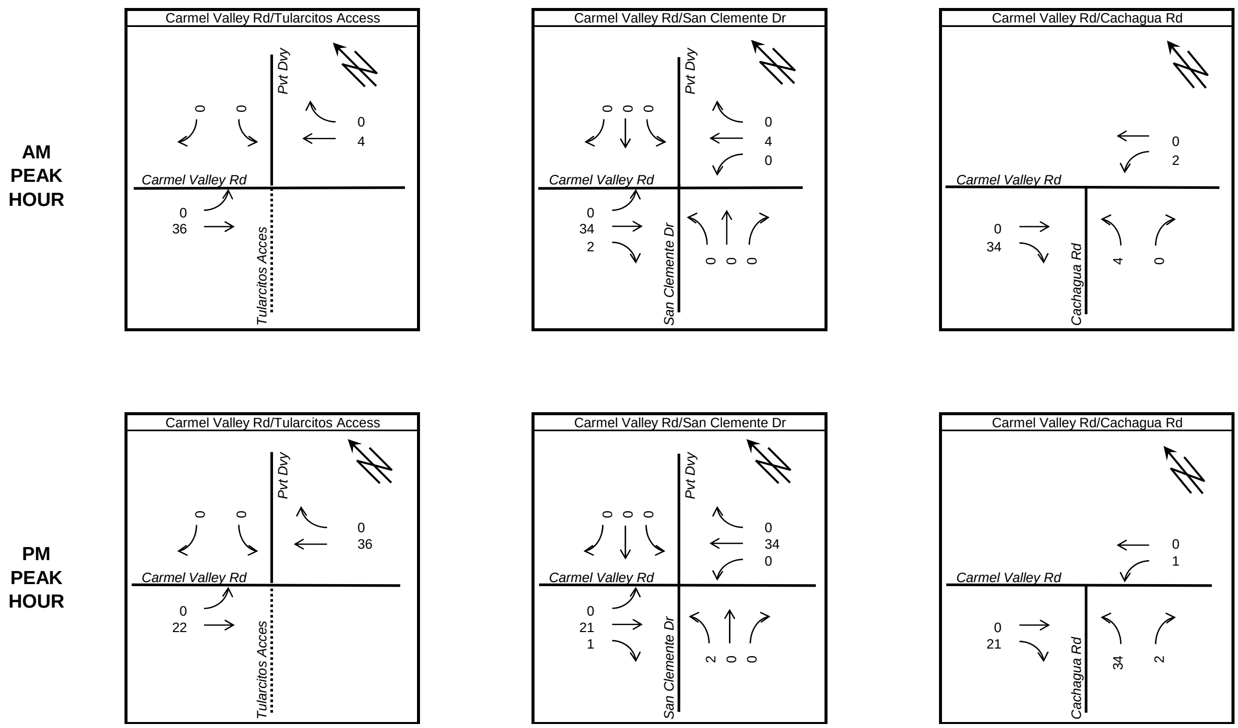
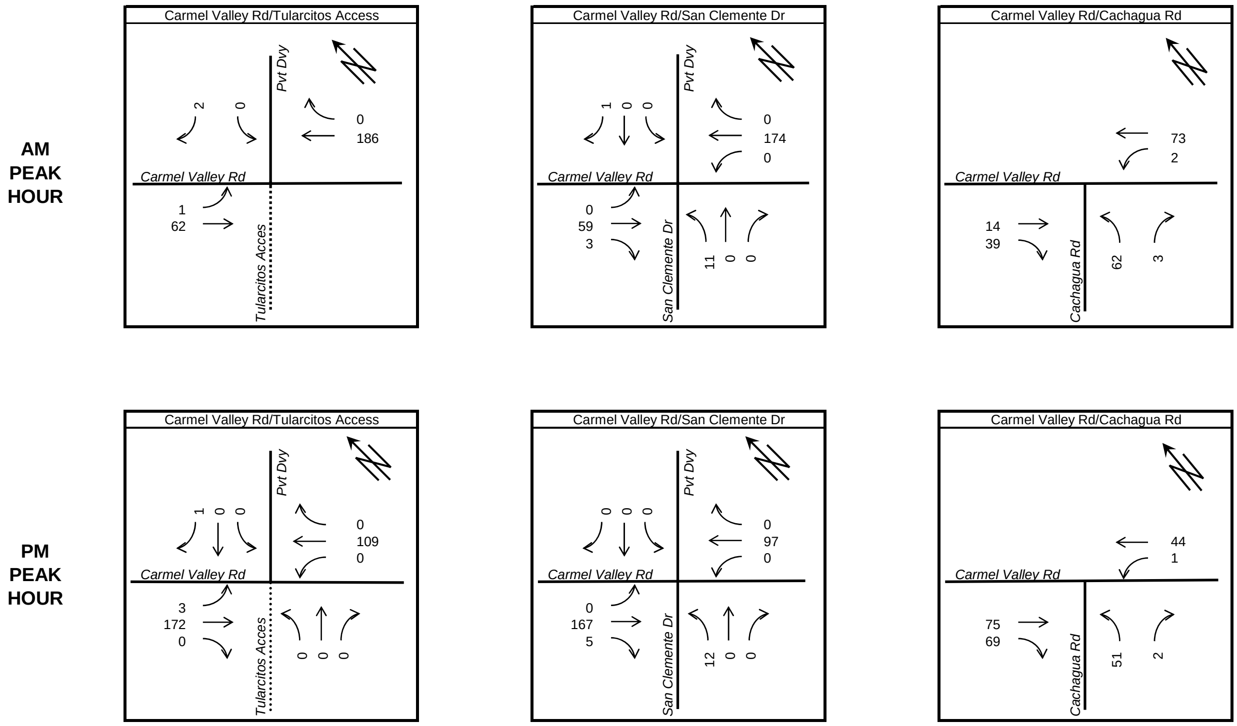


Figure 4.9-8: Existing Plus Alternative 2 AM and PM Peak Hour Intersection Volumes



Alternative 2 would also add additional traffic loadings to San Clemente Drive. Based on Monterey County pavement design standards, San Clemente Drive should be designed with a TI of 3.8 or greater. It would require over 100 large truck trips on San Clemente Drive to add the traffic loadings that would increase the TI by 0.1. The number of large truck trips added to San Clemente Drive would not approach the number of truck loadings required to change the TI.

MITIGATION

Mitigation would be the same as described for Alternative 1.

Alternative 3 (Carmel River Reroute and Dam Removal)

Traffic and Circulation impacts and mitigation measures for Issues TC-3a (Traffic Safety Carmel Valley Road), TC-3b (Traffic Safety San Clemente Drive), Issue TC-4 (Inadequate Corner Sight Distances), and TC-6 (Neighborhood Quality of Life) would be the same as discussed for Alternative 1. Impact TC-5 (New Intersections) would not apply, as there would be no new intersections.

Issue TC-1: Road Segment Traffic Operations

Additional traffic on area road network
*Determination**: significant, unavoidable, short-term***

IMPACT

The Alternative 3 trip generation statistics are summarized in Table 4.9-6. Employee data for each phase of the Alternative 3 construction project is provided in Section 3.5. Phasing and information regarding access road improvements is also provided in Section 3.5.

Table 4.9-6: Alternative 3 (Carmel River Re-route and Dam Removal) Trip Generation

		AM PEAK HOUR				PM PEAK HOUR			
GENERATOR	DAILY TRAFFIC GENERATION	PEAK HOUR VOLUME	% OF DAILY	INBOUND	OUTBOUND	PEAK HOUR VOLUME	% OF DAILY	INBOUND	OUTBOUND
VEHICLE TRIPS									
VEHICLE TRIPS PHASE 1 (Year 1)									
Employee Trips	60	17	28%	15	2	17	28%	2	15
Truck Trips	8	2	25%	1	1	2	25%	1	1
Total Trips	68	19	28%	16	3	19	28%	3	16
VEHICLE TRIPS PHASE 2 - (Year 2-4)									
Employee Trips	160	22	14%	20	2	40	25%	20	20
Truck Trips	0	0	-	0	0	0	-	0	0
Total Trips	160	22	14%	20	2	40	25%	20	20
PASSENGER CAR EQUIVALENCIES									
PCE's PHASE 1 (Year 1)									
Employee Trips	60	17	28%	15	2	17	28%	2	15
Truck Trips	32	8	25%	4	4	8	25%	4	4
Total Trips	92	25	27%	19	6	25	27%	6	19
PCE's PHASE 1 (Year 2-4)									
Employee Trips	160	22	14%	20	2	40	25%	20	20
Truck Trips	0	0	-	0	0	0	-	0	0
Total Trips	160	22	14%	20	2	40	25%	20	20

NOTES:
PCE's = Passenger Car Equivalent

The amount of aggregate that would be required to improve the Jeep Trail and the new road between the Jeep Trail and the Dam would be less than required for Alternatives 1 and 2, because the new road would be constructed to a 15-foot width for Alternative 3, rather than the 25 foot width required for Alternatives 1 and 2. It is estimated that access improvements for Jeep Trail and the new road between the Jeep Trail and the Dam for Alternative 2 would require 3,750 cubic yards of material. Delivered over a 60 day period in 18 cubic yard trucks, an average of 4 inbound loads per day, or 8 truck haul round trips per day would be required to import the material for road improvements. With 15 employees on the site during Phase 1, total trip generation during Phase 1 would be 68 vehicle trips per day.

Phase 2 would require three years to complete, with 40 workers split between two shifts. On this basis, 160 trips would be generated per day during Phase 2.

Table 4.9-1 shows the assignment of Alternative 3 project daily trips to the study road segments and the road segment levels of service. With Alternative 3 traffic added to the road network, the existing road segment levels of service would not be changed.

Under Alternative 3, access improvements to the Jeep Trail as described for Alternative 1 would be constructed, except that the new road constructed from between the Jeep Trail and the reservoir would be constructed to a width of 15 feet, not 25 feet. The new road would only be used by construction personnel and not other property owners.

The Jeep Trail would be used for employee access throughout the construction period and for the delivery of construction equipment. Alternative 3 would entail use of the Jeep Trail and new road connecting the Jeep Trail to the reservoir (following the same alignment as would be used for the conveyor road under Alternatives 1 and 2). Levels of use under Alternative 3 are estimated as follows:

- Project worker access during construction (all year during the first construction season and May to October during the following two seasons) through the Jeep Trail that passes by the Stone Cabin and then, once constructed, to the conveyor road.

- Mobilization of heavy earth moving and construction equipment (roughly 20 to 40 trips of large equipment) at the beginning and end of each construction season (May and October) for 3 seasons, averaging 2 to 3 loads per day for the first and last month of construction.

- Occasional (bi-weekly) mid-size equipment mobilization (e.g., equipment/supply trucks, cranes, backhoes, and small dozers).

During the peak construction activity, it is estimated that 160 vehicle trips per day would be generated by Alternative 3, most of which would use the Jeep Trail between Cachagua Road and the new access road to the reservoir. The 20-foot wide sections of the Jeep Trail between Cachagua Road and the new access road to the reservoir would be adequate for two-way travel. Turnouts would be provided along the sections of the Jeep Trail that would be limited to one-way travel. During the movement of large trucks into and out of the site via the jeep trial, flagmen with radios would be used to control traffic movements on the Jeep Trail.

As with Alternatives 1 and 2, non-project related traffic using the Jeep Trail would be subjected to delays during the construction of improvements to the Jeep Trail. As described for Alternatives 1 and 2, the impact of the project during the construction of improvements to the Jeep Trail would be significant because it is not known if the amount of delay that a motorist would experience during the road construction period would be less than 10 minutes.

During mobilization periods, heavy earth moving equipment and construction equipment would be transported by truck to and from the reservoir. Alternative 3 does not include the use of a conveyor system. As described for Alternative 1, during project operations following the completion of improvements to the Jeep Trail, the delay experienced by non-project traffic on the Jeep Trail while large trucks are traversing the trail is estimated to be less than 10 minutes and, therefore, the delay would not be a significant impact under Alternative 3.

As with Alternatives I and 2, a Construction Management Plan would be developed for the Jeep Trail that includes a Trip Reduction Plan for Construction Workers, Traffic Coordination and Communication Plan and a Traffic Safety Plan for Alternative 3. The CMP would include measures to minimize the delay to non-project related Jeep Trail users during construction of improvements to the road and during subsequent project activities. Because it is not known whether delays to non-project related users could be reduced to less than 10 minutes during the construction of improvements to the trail, the impact of Alternative 3 to Jeep Trail users would be significant and unavoidable. Impacts during the construction of improvements to the Jeep Trail could be reduced to less than significant levels if the Communication Plan includes procedures that allow the other users of the Jeep Trail to provide the construction contractor with a schedule for their use of the Jeep Trail. Construction activities could then be planned to minimize delays to the other users of the Jeep Trail.

MITIGATION

Mitigation would be the same as described for Alternative 1.

Issue TC-2: Intersection Traffic Operations

Changes to intersection level of service
Determination: ***less than significant, no mitigation required***

IMPACT

Alternative 3 would generate 19 trips during the AM and PM peak hours during Phase 1 and 22 trips during the AM peak hour and 40 trips during the PM peak hour during Phase 2. For intersection capacity and channelization analyses, the peak hour truck trips generated by the Alternative 3 project were converted to passenger car equivalent trips to account for the greater impact associated with each truck in the vehicle stream. Consistent with previous traffic analyses prepared for the project; four passenger car equivalents (PCEs) were assumed per truck.

Figure 4.9-9 shows the assignment of AM and PM peak hour trips generated by the Alternative 3 project to the study intersection. The passenger car equivalent trip generation estimates for Phase 2 were used in this analysis. A trip distribution pattern of 95 percent to the west and 5 percent to the east was assumed for the project. Cachagua Road would be the primary access to the Dam for Alternative 3 and 95 percent of the traffic generated by the project was assigned to Cachagua Road.

Alternative 3 AM and PM peak hour intersection volumes were achieved by combining the AM and PM peak hour traffic assignment for the project with the existing intersection volumes. The Alternative 3 AM and PM peak hour intersection volumes are shown on Figure 4.9-10.

Figure 4.9-9: Alternative 3 (Carmel River Re-route and Dam Removal) AM and PM Peak Hour Trip Assignment

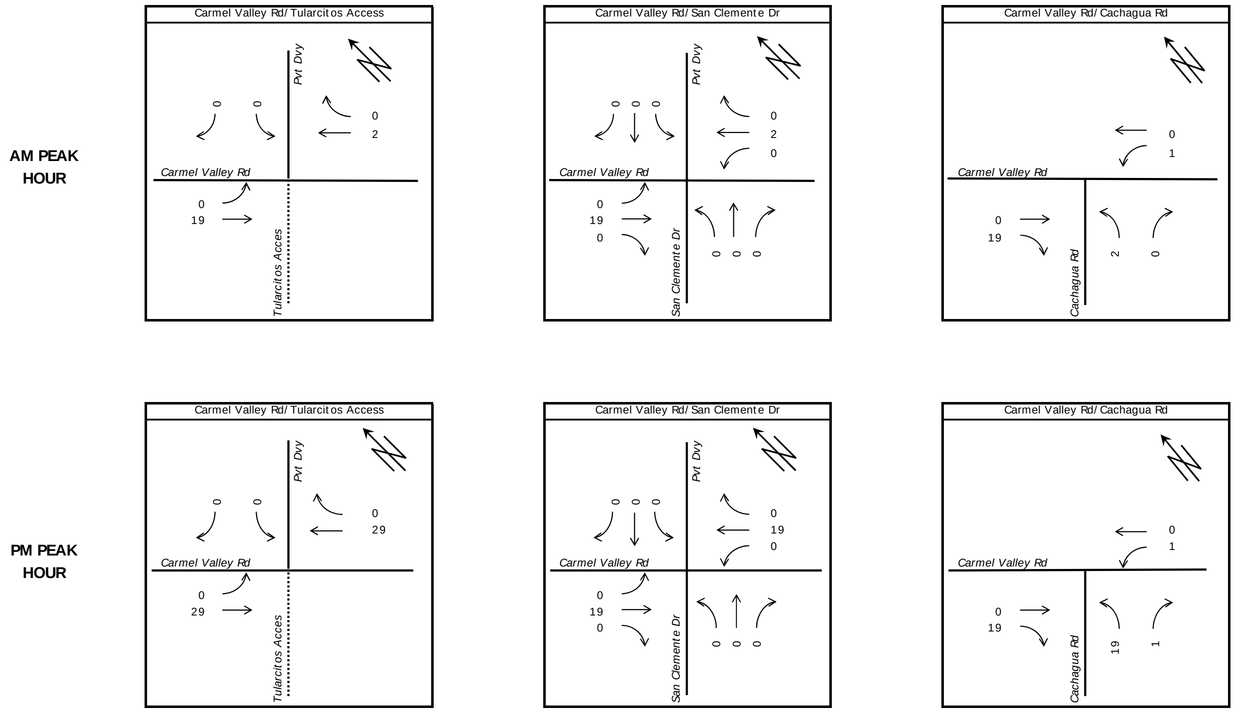
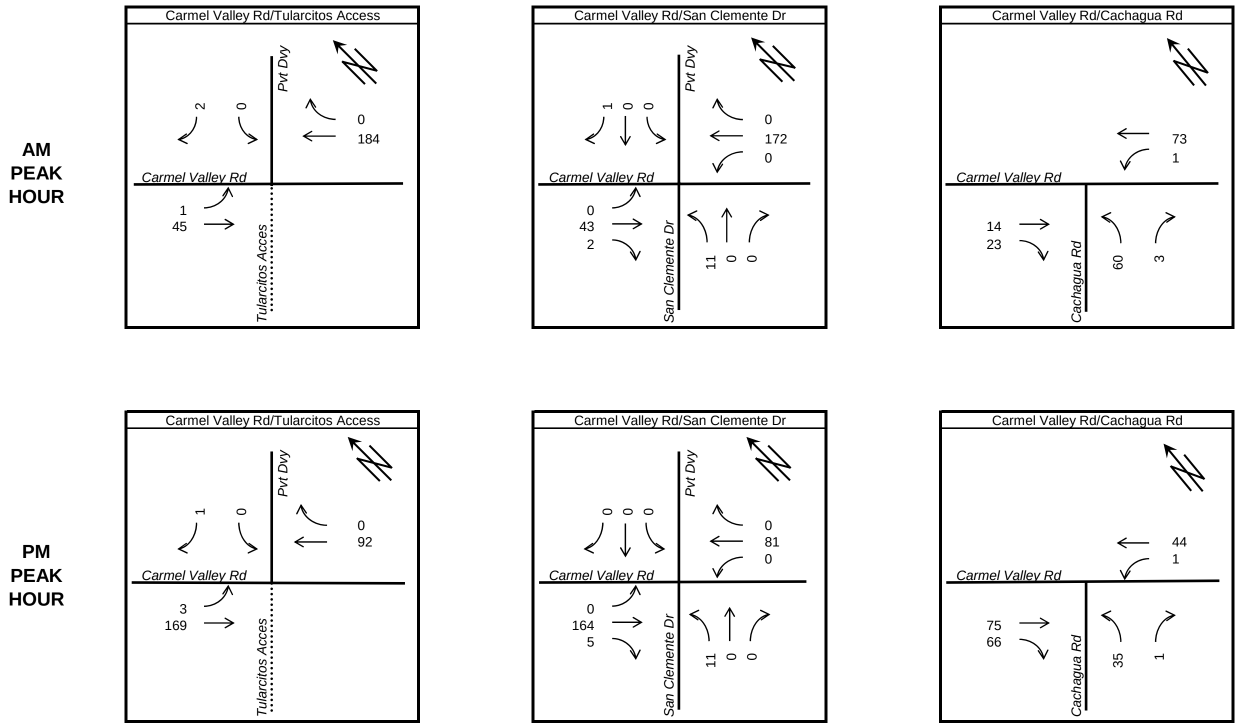


Figure 4.9-10: Existing Plus Alternative 3 AM and PM Peak Hour Intersection Volumes



Alternative 3 intersection operations were evaluated based on technical procedures documented in the 2000 HCM. The Alternative 3 AM and PM peak hour intersection levels of service are summarized in Table 4.9-1. With the traffic from project Alternative 3 added to the study intersections, intersection levels of service would be unchanged from existing conditions.

MITIGATION

Mitigation for TC-6 would not be required under Alternative 3.

Issue TC-7: Pavement Loadings

Effect of project traffic on pavement

Determination: ***less than significant with mitigation, short-term***

IMPACT

Alternative 3 would generate an estimated 480 truck trips over the duration of the project. Over a 10-year design period, the project would generate an average of 0.18 truck trips per day, which would generate 636 equivalent single axle loads (ESALs). With the Alternative 3 traffic loadings added to the existing ambient loadings on Carmel Valley Road, the total ESALs would increase to 77,460, which equates to a TI of 6.6. The TI would not change with the additional loadings generated by the Alternative 3.

The existing truck loadings on Cachagua Road equate to a TI of 5.8. With the Alternative 3 traffic loadings added to the existing ambient loadings, the total ESALs would increase to 26,818, which equates to a TI of 5.9. The TI would change with the additional loadings generated by the Alternative 3.

Alternative 3 would also add additional traffic loadings to San Clemente Drive. Pavement loading impacts to San Clemente Drive for Alternative 3 would be the same as the impacts described for Alternative 2.

MITIGATION

Mitigation would be the same as described for TC-7 in Alternative 1.

Alternative 4 (No Project)

No contruction activities are associated with the No Project Alternative; therefore there would be no additional impacts an

4.10 CULTURAL RESOURCES

This section describes the effects on cultural resources of the Proponent's Proposed Project and its alternatives during construction and operations for the project site, maintenance areas and immediate surroundings. Additional information provided in this Final EIR/EIS clarifies and amplifies the information included in the Public Draft EIR/EIS. The cultural resources analysis describes short- and long-term effects that would result from construction, demolition, or operation of the Dam, reservoir, and associated infrastructure.

Cultural resources include historic properties that are archaeological sites or historic structures. Archaeological sites date from approximately 12,000 BC through the historic period, which can be as recent as AD 1950. In accordance with the California Office of Historic Preservation's (OHP) California Register of Historical Resources (CRHR) standard, under CEQA, historic structures must be at least 45 years old. These two types of historic properties are addressed separately in this section because the resources are affected differently by project construction and operations. Under Section 106 of the National Historic Preservation Act (NHPA), federal agencies must consider effects on historic properties. "Historic properties" are defined as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register of Historic Places" (NRHP) (36 CFR 800.16). The term includes artifacts, records, and remains that are related to and located in such properties. It also includes "traditional cultural properties" (TCPs) that are eligible for inclusion on the NRHP.

The California State Parks Office of Historic Preservation administers the State's NRHP program under the direction of the State Historic Preservation Officer (SHPO). The following NRHP criteria serve as the basis for evaluating a historic property's eligibility for listing (36 CFR 60):

- Quality of significance in American history, architecture, archeology, and culture for districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association.

- Association with events that have made a significant contribution to the broad patterns of our history or embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, and/or represent a significant and distinguishable entity whose components may lack individual distinction.

- Whether the property has yielded or may be likely to yield information important in prehistory or history.

- Resources less than 50 years old do not meet the NRHP criteria unless they are of exceptional importance.

Consideration of effects must include the Area of Potential Effect (APE). The APE includes the "geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The intent of the federal Executive Order (EO) 11593, Protection and Enhancement of the Cultural Environment has been integrated into Section 110 through 1980 amendments to the Act. Under NEPA, Federal agencies must take into account impacts to historical resources, or those resources that are eligible for the NRHP, before a project is approved. The Section 106 process has been integrated with the NEPA process for this project.

Recent amendments to Section 106 of the NHPA specify that properties of traditional religious and cultural importance to a Native American Tribe, also known as TCPs, may be determined to be eligible for inclusion on the NRHP. In carrying out its responsibilities under Section 106, the USACE is required to consult with any Native American tribe that may attach religious or cultural significance to any such properties.

Criteria for Evaluation of Historic Properties

Federal

The NRHP is the federal list of historic, archaeological, and cultural resources worthy of preservation. Resources listed in the NHRP include districts, sites, buildings, structures, and objects that are significant in American history, prehistory, architecture, archaeology, engineering, and culture. The quality of significance in American history, architecture, archaeology, and culture is possible in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association, and meet one of the following criteria:

Criterion A: Are associated with events that have made a significant contribution to the broad patterns of our history; or

Criterion B: Are associated with the lives of persons significant in our past; or

Criterion C: Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

Criterion D: Has yielded, or may be likely to yield, information important in prehistory or history (36 CFR Part 60).

Archaeological sites are primarily assessed under Criterion D. Buildings less than 50 years old do not meet the NRHP criteria unless they are of exceptional importance, as described in the National Park Service (NPS) Bulletin No. 22, "*How to Evaluate and Nominate Potential National Register Properties That Have Achieved Significance within the Last 50 Years*."

State

Regulatory compliance in relation to cultural resources is governed by CEQA. CEQA guidelines define a significant cultural resource as “a resource listed in or eligible for listing on the CRHR”. A historical resource may be eligible for inclusion in the CRHR if it is 45 years of age and:

- **Criterion 1**: Is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage;
- **Criterion 2**: Is associated with the lives of persons important in our past;
- **Criterion 3**: Embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values; or
- **Criterion 4**: Yields, or may be likely to yield, information important to prehistory or history.

4.10.1 ENVIRONMENTAL SETTING

Archaeological Sites

No previously unrecorded cultural resources were located during the survey. Two archaeological sites are located within 500 feet of the APE. CA-MNT-942 is a bedrock mortar and CA-MNT-1252H is the remains of a wood cabin. Because the resources are outside the APE, no attempt was made to relocate them. Table 4.10-1 includes a list of the archaeological resources that were inventoried in the APE for the Proponent’s Proposed Project.

Table 4.10-1: Inventoried Archaeological Resources for Proponent’s Proposed Project (APE)

Field Site Numbers	Resource Name (Previously Assigned Site number)	Historical Significance	Relevant inventoried NRHP/CRHR* Criteria or Reason for Omission
AR-1	Occupation Site CA-MNT-33A and CA-MNT-33B	Eligible	NRHP Criterion D CRHP Criterion 4
AR-2	Bedrock Mortar Feature CA-MNT-586	Ineligible	Site removed or destroyed
AR-3	Cabin & Outhouse CA-MNT-814H	Ineligible	Cabin demolished
AR-4	Two Bedrock Mortar Features CA-MNT-1253	Unknown	Testing Required

* NRHP = National Register of Historic Places; CRHR = California Register of Historic Resources

CA-MNT-33A AND CA-MNT-33B (AR-1)

Initially discovered as early as 1948, this site is situated along the bank of the Carmel River near the current CVFP. The site consists of two large midden areas separated by a small, possibly sterile, area. Constituents of the site include shell and faunal bone fragments, some of which appear to be burned, lithic tools, mortar fragments, pestles, metates, and other possibly ground stone milling tools. At least five bedrock mortar features have been located along the riverbank.

Previous investigations at the site have included a 1972 excavation of five test pits by the Monterey County Archaeological Society, reported by Howard (1974). The reporting, however, was very limited and no further data were available until Gerrit Fenenga (1988) studied a small sample of shell artifacts from the site. Fenenga employed Bennyhoff and Hughes' (1987) typology for his analysis. Fenenga found a large assortment of *Olivella biplicata* shell beads, ranging from spire-lopped to saucer shaped specimens. Fenenga's investigation found temporally diagnostic shell artifacts are present at CA-MNT-33A, which date to the early and middle portions of the Middle Period (2100 to 1500 BP). A radiocarbon sample obtained from one excavation unit, approximately 133cm below surface returned a date of 2285 ± 100 BP (WSU-2388). Therefore, it can be assumed that CA-MNT-33A was undoubtedly occupied during the early Middle Period and possibly before.

A dirt and gravel access road is located across a portion of the site. This road appears to have been in place since the original recordation of the site. Previous site records also report other disturbances to the surface including gardens and fencing. Currently, a dirt road crosses the recorded boundaries of the site, but no other structures are evident. No disturbance of subsurface deposits seems likely with the exception of the settling ponds and the previous excavation.

Based on ethnographic maps, CA-MNT-33 may be the site of the village *Socorronda,* reported by Spanish missionaries to be located within the upper Carmel River drainage.

This large village site has the potential to contain important information on the prehistoric inhabitants of the area. Therefore, the site is recommended eligible for listing on the NRHP and CRHP under Criteria, D and 4, respectively.

CA-MNT-586 (AR-2)

This site is a possible bedrock mortar feature near a historic homestead CA-MNT-814H adjacent to Tularcitos Creek. The site was initially recorded in 1974 (Farley et al. 1974) and has since been removed or destroyed. This site is not eligible for the NRHP or CRHR.

CA-MNT-814H (AR-3)

Originally the site of a cabin and ancillary buildings, the site was reported as deteriorating in 1974 (Farley et al 1974). The cabin was located on a sloping flat above the west bank of Tularcitos Creek near a bridge crossing. A 1983 site record update reports that the cabin was bulldozed to make way for a new home built on Lismore Lane in 1979 (Jacques 1983). No evidence remained of the cabin or other structures. This site is not eligible for the NRHP or the CRHR.

Directly east of this site is the old location of the Tularcitos Guard Station, once used by the California Department of Forestry. The guard station was constructed after WWII. It was abandoned and buildings were removed during the 1980s (pers. comm. between Don Lingenfelter, CAW, and Brett Rushing, ENTRIX July 2005). A mortared river rock wall remains at this location and was not inventoried.

CA-MNT-1253 (AR-4)

Located on the peninsula at the confluence of San Clemente Creek and the Carmel River, the site consists of two bedrock mortar (BRM) features near the shoreline of the San Clemente reservoir (Westec 1983). Originally recorded as a single BRM, a subsequent survey found another BRM feature in the vicinity, which was added to the original site (Hampson 1987). The BRM features remain intact.

Although no artifacts have been located in association with the two features, the site area has never undergone a controlled archaeological testing program. Therefore, if the site could not be avoided, it would need to be tested to determine the nature and extent of any subsurface cultural deposit and to establish eligibility for the NRHP and CRHR.

Historic Structures

The inventory resulted in the identification of eight individual historic resources and one historic district. The individual resources included two dams and associated fish ladders, a filtration plant, two chemical treatment buildings, two dam keeper houses, and a Stone Cabin. Their association with the Monterey Division waterworks thematically links all identified resources except for the Stone Cabin. A district record form was subsequently created for the SCD Historic District.

A primary record form was also prepared for each individual building or structure within the historic district. A separate inventory form was prepared for the Stone Cabin (HR-8) because that resource is contextually linked with recreational resources. The historic district form notes the presence of historical pipelines connecting the reservoir to the CVFP and the historical access road, San Clemente Drive. Table 4.10-2 includes a list of the inventoried historic structures associated with the project and the alternatives within the APE.

Table 4.10-2: Inventoried Historical Structures

Field Site Number	Resource Name (Previously identified site number)	Historical Significance	Relevant NRHP/CRHR Criteria or Reason for Omission
HR-1	Chemical Building near Filtration Plant	HD* Contributing Resource	NRHP Criterion A CRHR Criterion 1
HR-2	Dam Keeper's House 2	HD Contributing Resource	NRHP Criterion A CRHR Criterion 1
HR-3	Filtration Plant	Non-Compatible Non-Contributing	Altered
HR-4	Old Carmel River Dam & Fish Ladder CA-MNT-1249H	HD Contributing Resource & Individually Eligible	NRHP Criteria A and C CRHR Criteria 1 and 3
HR-5	Dam Keeper's House 1 CA-MNT-1248H	Contributing Resource HD	NRHP Criterion A CRHR Criterion 1
HR-6	Chemical Building near reservoir	HD Contributing Resource	NRHP Criterion A CRHR Criterion 1
HR-7	SCD & Fish Ladder CA-MNT-1248H	HD Contributing Resource & Individually Eligible	NRHP Criteria A and C CRHP Criteria 1 and 3
HR-8	Stone Cabin CA-MNT-812	Individually Eligible Resource	NRHP Criterion C CRHR Criterion 3
HR-9	SCD Historic District	Eligible	NRHP Criterion A CRHR Criterion 1

Note: Historic resources are located within the Proponent's Proposed Project and alternatives.

CHEMICAL BUILDING FOR FILTRATION PLANT (HR-1)

This building is located directly west of San Clemente Drive just north of the Dam Keeper's Cottage 2. The building includes a small concrete block structure and storage tank enclosed by chain-link fences. The fenced area where the tanks are located has a concrete slab foundation and fencing along its perimeter. Another fenced area without a foundation is located to the east. A pipeline is located adjacent to the west side of the building (pers. comm. between David Norris, CAW Consulting Engineer and Marcia Montgomery (ENTRIX 2005b).

The CVFP was constructed by CAW's predecessor in 1947 in response to customer's complaints about water quality. This building was constructed during this same period for use as a chemical storage building.

The Chemical Building near the CVFP is eligible for the NRHP Criterion A and CRHR under Criterion 1 as a contributing resource to the SCD Historic District and dates to the secondary period of significance.

DAM KEEPER'S COTTAGE 2 (HR-2)

The SCD became the property of the California Water and Telephone Company by 1935 during a period when the region's population began to grow rapidly. From 1930 to 1950, the number of active water connections in the Monterey area more than doubled. In 1940, the California Water and Telephone Company built this house for a full-time caretaker at the San Clemente Reservoir to insure the protection of the supply

(Monterey Peninsula Herald 1940). By 1947 the CVFP was added in close proximity to the house and adjacent to the San Clemente Access Road.

This one-story wood-frame house has a low-pitched intersecting gable roof. An inset porch is located on the center of the front south elevation and is supported by a square wooden post. The house is clad with horizontal wood siding and board and batten siding in the gable ends. The composite shingle roof has slightly overhanging rafter ends. The west and east elevations are void of windows. The west elevation includes a brick chimney. Windows are wood-frame and double-hung. A white picket fence encloses the yard. A wood-frame detached two-car garage with a shed roof and board-and-batten siding is located to the east of the house. The house is still in use.

The Dam Keeper's Cottage 2 is eligible for the NRHP under Criterion A and for the CRHR under Criterion 1 as a contributing resource within the SCD Historic District and is from the secondary period of significance.

CARMEL VALLEY FILTER PLANT (CVFP) (HR-3)

The CVFP was constructed in 1947 to filter solids from the water. This was partially in response to customer complaints during heavy run-off periods. The plant was built on the Carmel River one mile below the SCD. Water from the reservoir was diverted through a 30-inch transmission main to two large steel tanks, where the water was filtered by forcing it through layers of sand and gravel. After leaving the filters it was chlorinated (a second time for the system) and fed into the water system (Management Team 1954). In 1954 the plant had 12 filter units, however in the following years, 14 and then 16 filter units were used.

Filtration processes and equipment have changed since the plant was constructed, requiring many changes to the facility. The CVFP currently includes a rectangular side gable building with eight horizontally oriented tanks lying above ground on the northeast side of the structure. The building has seven square windows spaced evenly under the eaves of the standing seam roof. Another metal roof and side gable building, slightly lower in height, extends further to the west. This addition has metal slider windows and a door set in a cement wall. Southeast of the building and tanks on the grass is a small wooden shed roof building with a door and larger front gable concrete building with a standing seam roof. Two vertically oriented tanks stand east of these two buildings. A chain link fence surrounds the entire complex. A cement path leads from the road and a gate to the concrete building and tanks. The 30-inch main enters the fenced area in the southeast corner. A 1947 photograph of the CVFP shows a 1.5 story steel frame shed open at the front and sides next to horizontal tanks.

This building is ineligible for the NRHP or CRHR and classified as a non-contributing resource within the historic district because it has been extensively modified and expanded in order to keep up with existing water treatment methods.

OLD CARMEL RIVER DAM (OCRD) AND ASSOCIATED FISH LADDER (HR-4)

The OCRD is a low embankment dam that is rock fill faced with coursed rubble masonry. It is eight feet thick at the base and four feet thick at the crest. Embankment dams were first used in California by gold miners in remote areas in the 1850s. They used explosives to create rockfill out of granite and the fill was held in place by logs. These dams were called rockfill, log-crib dams. Later rockfill dams were faced with masonry, concrete, asphalt and steel. Few have been built since the early 1900s (Jones & Stokes 1998). A cement fish ladder is located on the north end of the Dam. The gate and gate controls are located at the south end of the Dam (Archaeological Consulting 1987b).

A vehicular bridge supported by two large concrete columns was added after the original construction of the bridge. The bridge deck is wooden and the railing on the edge of the bridge is wooden. An abandoned road stretches from the OCRD along the east side of the river to the SCD.

The OCRD is eligible for the NRHP as a contributing resource to the SCD Historic District, dating to the primary period of significance. It is also individually eligible for the NRHP under Criteria A and C. It is eligible under Criterion C as a good example of gravity load masonry dam constructed during the period when dams were transitioning to concrete arch dams. It is associated with the events that have made a significant contribution to the economic development of the Monterey Division thereby making it eligible for the NRHP under Criterion A. It is also eligible for the CRHR under Criteria 1 and 3.

DAM KEEPER'S COTTAGE 1 (HR-5)

The Dam Keeper's Cottage 1 was previously inventoried as part of the SCD Guest Ranch Complex in 1983 (Jacques 1983). Historical records indicate that numerous buildings were erected at the west end of the Dam during the original construction of the Dam beginning in 1919. According to the previous inventory record these additional buildings became part of the Del Monte Properties San Clemente Guest Ranch, which operated from 1930 to 1965. In 1981 most of the buildings were demolished.

The Dam Keeper's Cottage 1 was constructed circa 1920. The small wood-frame house has a low-pitched gable roof and horizontal wood siding. The front entrance is centered on the south elevation. Wooden stairs lead to a small porch centered on the front of the house and sheltered by a shed roof. A large picture window is located to the west of the porch and there are two more windows on either side of the front door. The windows throughout the house are wood and metal frame. At the northwest corner of the house, the north and west elevations have two side-by-side four-over-four double-hung sash windows on the north and west elevations. A small shed-roof addition is located at the east end of the north elevation. A detached garage is located to the east of the house. To the north and west of the house is a mortared cobblestone wall and fire pit dating from the historic period.

The Dam Keeper's Cottage 1 is eligible for the NRHP under Criterion A and CRHR under Criterion 1 as a contributing resource within the SCD Historic District and is from the primary period of significance.

CHEMICAL BUILDING NEAR RESERVOIR (HR-6)

The Chemical Building near the reservoir was added west of the SCD in 1946-47 at the same time as the CVFP, for use as a storage facility for chemicals used to treat the reservoir water. Today, the building is used for general storage and houses equipment used in tracking seismic activity (pers. comm. between David Norris, consultant to CAW and Marcia Montgomery (ENTRIX 2005b). The Chemical Building is a Quonset hut and has a rectangular plan, corrugated metal siding, and a concrete foundation/basement level. Unlike a typical Quonset hut roof the arched form of the roof ends at the top of the wall on the east elevation, which is flat. The front or north elevation has wooden stairs leading to a three panel industrial wooden door on the west end of the building. A four-light awning window is located at the east end of the elevation. West of the window is a gasoline storage rack mounted to the building and to the east of the window is an electrical panel. The east elevation is corrugated metal and wooden siding with a door at the south end of the elevation. Concrete stairs and a small landing lead to the door. Because the building is sited on a hill the basement area below the landing is exposed and includes a door to access the basement level. The south elevation has corrugated metal siding on the upper level and concrete on the daylight basement level. Two four-light metal frame awning windows. The lower level also has two windows and a door.

The Chemical Building is eligible for the NRHP under Criterion A and CRHR under Criterion 1, as a contributing resource to the SCD Historic District and dates to the secondary period of significance.

SAN CLEMENTE DAM AND ASSOCIATED FISH LADDER (HR-7)

Lars Jorgensen, a leader in constant angle arch dam designing, and engineer J.A. Wilcox designed the SCD in 1919 to bridge the Carmel River. It was the first constant angle arch dam in California. Arch dams transmit water loads to the sides, rather than to the bottom, unlike gravity dams. (Jones & Stokes 1998). They are well adapted to narrow gorges and produce substantial savings in costs compared to the gravity dam. The basic arch dam shapes are the constant radius, the constant angle, and the double curvature arch. The constant angle arch is a variable radius arch; the arch radius increases from base to angle. The design is based on a constant central opening angle. Jorgensen demonstrated that the Dam contained minimum material for an optimum opening angle of 133.6 degrees (James 2000).

The Dam was designed to allow the floodwater to overflow the crest of the Dam, to increase its height ten feet, and to allow ten feet of water to overflow the entire top at its ultimate height (Wilcox 1918). Chadwick and Sykes completed the Dam measuring 106 feet high and 300 feet long at the crest in two years (Jones & Stokes 1998).

The top of the Dam was 85 feet above the streambed. The contractor's estimate included excavation, the reinforced concrete dam, a valve house, a water tower and control house, and a fish ladder on the downstream side of the Dam to assist steelhead traveling to upper waters (Chadwick and Sykes 1920). The fish ladder consists of twenty-four spillway gates and 23 pools that ascended 100 feet from the river at the base of the Dam to an opening in the west abutment of the Dam. The gates were timber, 13'6" x 6'4", specified to be cut from Puget Sound or Oregon forests (Chadwick and Sykes 1920).

The SCD is eligible for the NRHP and CRHR as a contributing resource to the SCD Historic District dating to the primary period of significance. It is also eligible for the NRHP under Criterion C and for the CRHR under Criterion 3 as the first example of a constant angle concrete arch dam in California. The Dam was constructed during the period when dams were transitioning to concrete arch dams.

STONE CABIN (HR-8)

The site consists of a restored stone and adobe-mortar cabin with associated rock walls, historic debris and stone cairns. Edwards/Hickman/Breschini previously recorded it in 1974 as a deteriorated Stone Cabin. Its new owners, a group of 10 investors, restored it for recreational use in 1978 to 1979. Westec Services updated the site inventory record in 1983. Archaeological Consulting recorded the archaeological site in 1987a.

The rectangular side-gable cabin faces due west towards the Carmel River. Its low slope roof with wooden shingles was replaced during its restoration. It has exposed rafter tails and two skylights. The cabin is constructed of uncoursed dressed stone. Original recordation notes adobe mortar flush with the stones, and previous reconstruction of the top half of the north and south walls. Cement mortar was used in its reconstruction. On the south end of the façade is a door constructed of vertical planks. The window north of the door is shuttered with three vertical planks. A (rebuilt) stone chimney runs up the south wall. Reconstructed flooring and benches are found in the interior.

Several 1920s Pebble Beach Company survey maps indicate "Murphy's Stone Cabin." Murphy is believed to be an earlier homesteader in the area. Murphy's Flat is named after Mike J. Murphy. A 1908 survey map places a corral directly north of the cabin. (Jacques 1983). Employees of Del Monte Properties used the cabin in the summer months in the 1920s but not as a year round residence. This building is eligible for the NRHP Criterion C and CRHR Criterion 3.

SAN CLEMENTE DAM (SCD) HISTORIC DISTRICT (HR-9)

The SCD Historic District includes resources within the Carmel River Valley south of the river's confluence with the Tularcito's Creek approximately 2.5 miles to the SCD. Contributing resources within the historic district fall into either the primary (1882 to

1935) or secondary (1935 to 1955) period of significance. The primary period of significance represents the early period of historical use during which the coastal communities that used the water from the Carmel River were growing due to the improved railroad transportation that spurred the agricultural, ranching, and tourism industries. The secondary period represents a later era of more widespread growth and a time in which new innovations such as water filtration and treatment were introduced, requiring the addition of new facilities in association with the waterworks. Contributing resources within the district are eligible for the NRHP (under Criterion A) and CRHR (under Criterion 1) for their historical association with the development of the Monterey Division waterworks, which contributed to the growth, development and economic expansion of the Monterey Peninsula. The contributing resources to the SCD Historic District collectively have historical significance for their association with the Pacific Improvement Company's development of a water system that directly affected the growth, development and economics of the Monterey Peninsula. The OCRD and SCD also have engineering significance.

2030 Baseline Conditions

The resources would continue to age through 2030, resulting in normal wear and tear on the resources. Regular maintenance of historic resources and replacement of in-kind historic materials, when necessary, would greatly lessen deterioration of the resources. Failure to maintain the resources in any form would result in more rapid degradation or deterioration of the resources. Archaeological resources, if undisturbed, would remain intact. Construction activities adjacent to or in the same area of the archaeological resources could damage or destroy the resources.

4.10.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

In accordance with CEQA, SHPO, and professional standards, a project impact would normally be significant if the project would:

- Disrupt or adversely affect a prehistoric or historic archaeological site or a property of historic or cultural significance to a community or ethnic or social group; or a paleontological site except as a part of a scientific study;
- Cause a substantial, adverse change in the significance of a historical resource as defined in § 15064.5 of the CEQA Guidelines;
- Cause a substantial adverse change in the significance of an archeological resource pursuant to § 15064.5 of the CEQA Guidelines;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;

- Disturb any human remains, including those interred outside of formal cemeteries.

Impact Assessment Methodology

This assessment evaluates and identifies impacts over a range of temporal scales. The three temporal impact categories are:

- Temporary impacts that occur within the construction period, but do last throughout the period;
- Short-term impacts that occur within the construction period (concurrent with the number of construction seasons, which vary from one alternative to another);
- Long-term impacts that persist beyond the construction period.

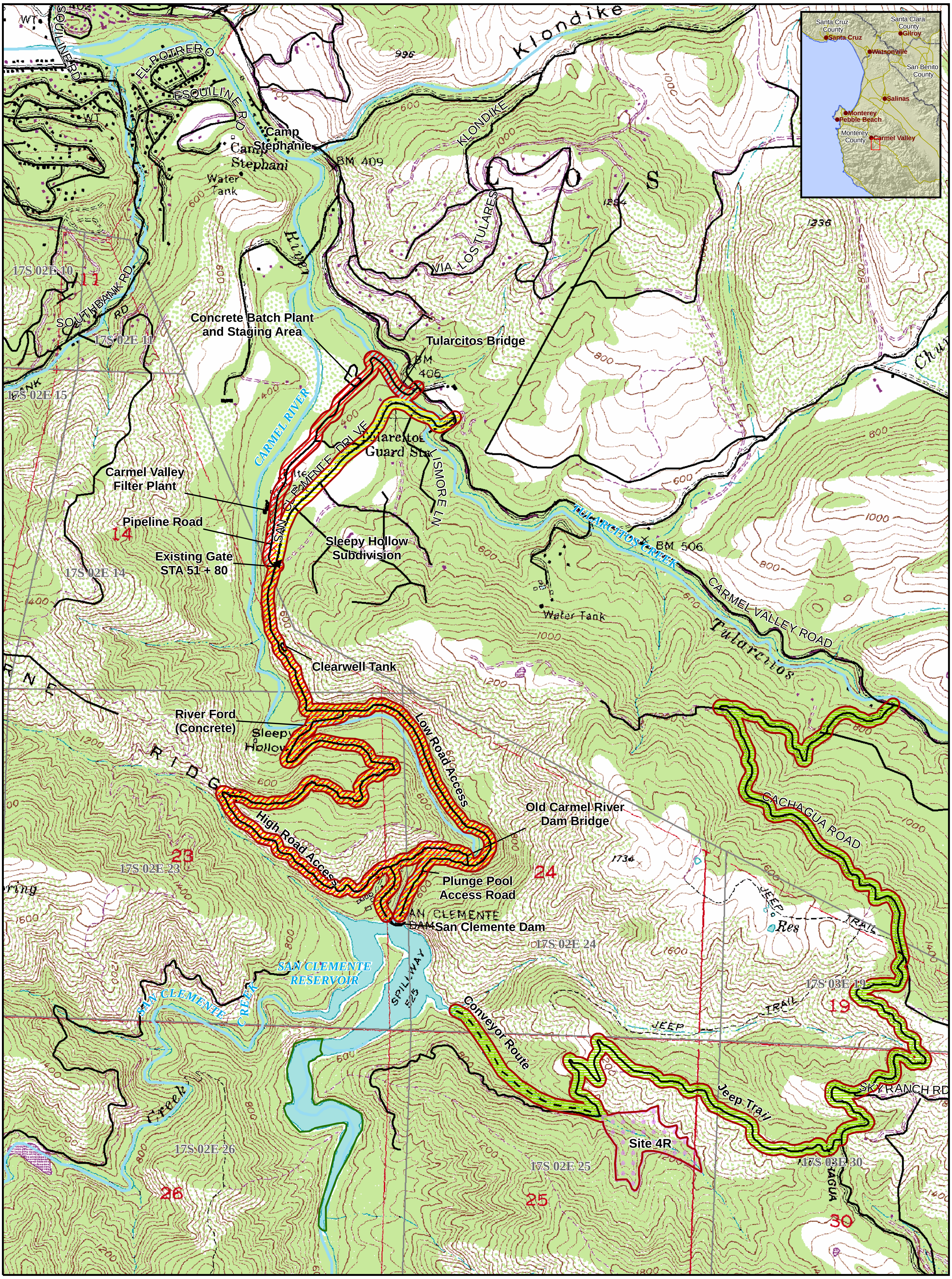
Determination of Area of Potential Effect (APE)

Following federal criteria, the eligibility of resources that are at least 50 years of age and are located within the APE or the "geographic area within which (the) undertaking may cause changes in the character of or use of historic properties" were evaluated (36 CFR 8002(c)). Per the California OHP, the threshold for historic resources, buildings and structures that were at least 45 years of age were also recorded. The APE accommodates short and long-term effects to historic resources as well as all potential ground-disturbing impacts to any archaeological resources. Below is a discussion of the APE for archaeological and historic resources, divided into three geographic areas within the project area. Figure 4.10-1 shows the APE in relation to the Project Area.

CACHAGUA/SITE 4R

The historic resource inventory includes an area of 100 feet in both directions from the edges of Cachagua Road, the Jeep Trail, and the conveyor route to the extent feasible depending on topography. In addition, the Site 4R was surveyed for 100 feet beyond the proposed boundaries.

The APE for archaeological inventory was limited to 100 feet from the centerline of the Jeep Trail and the conveyor route. Due to the steep topography and dense brush only the accessible portions of the conveyor route were surveyed. The boundaries of Site 4R constituted the archaeological APE in this area.



Legend

Access Routes

- Cachugua / 4R
- Sleepy Hollow
- Tularcitos
- Stream
- Existing Road
- Proposed Road
- Public Land Survey Section
- Sediment Disposal Site
- Archaeological Resource
- Historical Resource
- Archaeological and Historical APE
- Additional Historical APE

Projection: California State Plane, Zone IV
Datum: NAD 83 Units: Feet

San Clemente Dam EIS/EIR

Figure 4.10-1

APE Map

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SLEEPY HOLLOW AND SAN CLEMENTE DAM

The historic resource inventory included an area 100 feet in both directions from the edges of San Clemente Drive, including the loop and dam access roads to the extent feasible depending on topography. In addition, the SCD and associated facilities, the OCRD, and a water pipeline that parallels San Clemente Drive all are included within the APE. The shoreline of the original reservoir was surveyed.

The archaeological survey addressed three areas of the reservoir shoreline that would be affected by one or more alternatives. These include: the point where the conveyor route meets the shoreline, the access points for excavation equipment to be used for sediment removal, and the "saddle" between San Clemente Creek and the Carmel River that would be bisected to reroute the creek's water under one alternative. The balance of the upper reservoir was silted in to the extent that the original shoreline of the reservoir is now some distance from the reservoir waters, across vegetated dry land. The archaeological survey in these areas focused on lower slope landforms with the potential to contain archaeological materials. In addition, the APE included 50 feet in both directions from the edges of San Clemente Drive to the extent feasible depending on topography to account for potential impacts to resources from the proposed upgrading of this road.

TULARCITOS

Most of the areas described for existing access would be used under the Tularcitos option and the same APE applies to those. In addition, the currently unimproved Tularcitos access road (Figure 4.10-1) would be rebuilt to access a proposed concrete batch plant and staging area for the Proponent's Proposed Project. The historic resource inventory included an area 100 feet in both directions from the edges of this unimproved road, and in the area proposed for the batch plant and staging area.

The archaeological resources APE included all areas within 50 feet of the centerline of the unimproved road and 100 feet beyond the proposed boundaries of the batch plant and staging area location.

Archaeology Fieldwork

Prior to fieldwork, archaeologists gathered previously prepared historic property inventory forms for resources within the APE of the Proponent's Proposed Project from the Northwest Information Center of the California Historical Resources Information System.

Between June 27 and July 23, 2005, ENTRIX archaeologists conducted a pedestrian survey of the Proponent's Proposed Project APE. The field inventory consisted of pedestrian survey using generally parallel, meandering transects no more than 10 meters wide. Due to the heavy brush, poison oak, and steep terrain encountered at certain points of the alignment, approximately eight percent of the entire alignment was not surveyed. Heavy brush and dense poison oak coverage prohibited a complete archaeological survey of the sediment disposal site and the proposed conveyor route. The omitted areas are characterized by greater than 10 percent slopes, (sometimes as high as 75 percent) and heavy brush. Therefore, the likelihood of encountering intact cultural material in these areas was determined to be low.

The survey was accomplished by walking parallel transects of 30 to 60 feet (10 to 20 meters). Ground visibility was good in the areas surveyed, with some obstruction from low-lying grasses and shrubs. All visible ground within the APE was inspected for cultural remains as well as any cut banks, bedrock outcrops, boulders, or exposed sediments.

The SCD and surrounding area have undergone intensive archaeological reconnaissance over the past three decades. During the inventory for this Proponent's Proposed Project, previously recorded sites were revisited and site records updated as necessary including photographs, GPS mapping and plotting, and current condition. When previously recorded sites were relocated, either an addendum to the site form was prepared or a new site form was completed to reflect any changes since the previous recording; site updates used the California Department of Parks and Recreation (DPR) site continuation forms (DPR 523l). During the field inventory, archaeologists visited two previously inventoried historic archaeological resources (CA-MNT-811H and CA-MNT-812H) located at the south end of the reservoir along the Carmel River. The historic archaeological resources were photographed and notes on the present condition of the resources were collected.

Historic Structures Fieldwork

Prior to fieldwork, architectural historians gathered previously prepared historic property inventory forms for resources within the Proponent's Proposed Project APE from the Northwest Information Center of the California Historical Resources Information System. Information on specific resources in the APE was obtained from CAW Engineer Don Lingenfelter and CAW Consulting Engineer David Norris.

The SCD Historic District is one portion of the larger CAW Monterey Division public water system that serves the Monterey Peninsula. In June 2005, ENTRIX Architectural Historians conducted a reconnaissance level historic resources inventory of the Proponent's Proposed Project APE to identify historical resources that appeared to be potentially eligible for the NRHP or the CRHR. ENTRIX identified resources that retained integrity and that shared a thematic association with the development of the Monterey Division water system. Architectural historians recorded physical features of each resource on inventory forms, mapped its location using GPS, and photographed the resource with black and white film and a digital camera.

An inventory form was prepared for the SCD Historic District, which identifies seven historical resources, including the OCRD and SCD, two dam keeper cottages, a historical filtration plant, and two chemical treatment buildings. One additional resource, a Stone Cabin previously recorded as site CA-MNT-812, was also inventoried. This resource is located outside the boundary of the historic district. Figure 4.10-2 illustrates the location of each inventoried historical resource.

4.10.3 IMPACTS AND MITIGATION

Impact Issues

The issues potentially affecting historic properties regarding changes to the Dam and its associated facilities include the following:

- CR-1: Ground Disturbance (disturbance to archaeological sites)
- CR-2: Damage to Historic Structures from Construction-related vibration (construction related vibration)
- CR-3: Introduction of Temporary Dirt/Unintended Damage (construction/demolition-related accumulation of dirt)
- CR-4: Demolition or Alteration to the Historic Properties (alterations to the OCRD and associated fish ladder and to SCD)
- CR-5: Alteration to the Setting of Surrounding Environment (alter character of setting for SCD Historic Resource District)
- CR-6: Introduction of Visual Obstructions (loss of visual integrity for SCD Historic Resource District)

Proponent's Proposed Project (Dam Thickening)

Issue CR-1: Ground Disturbance

Disturbance to archaeological sites
Determination: ***less than significant with mitigation, long-term***

IMPACT

A large village site (AR-1) extends on both sides of the Tularcitos Access Route just north of the CVFP. Any improvement or increased use of the current access road near the CVFP would damage or destroy the archaeological resource. CA-MNT-33A and B have been recommended eligible for listing on the NRHP. As portions of these sites within the APE are still intact, monitoring of construction activities at these sites is recommended to protect those portions from inadvertent damage. Ground disturbance would occur in the short-term and could have long-term effects and a significant and unavoidable impact. CA-MNT-1253 remains unevaluated.

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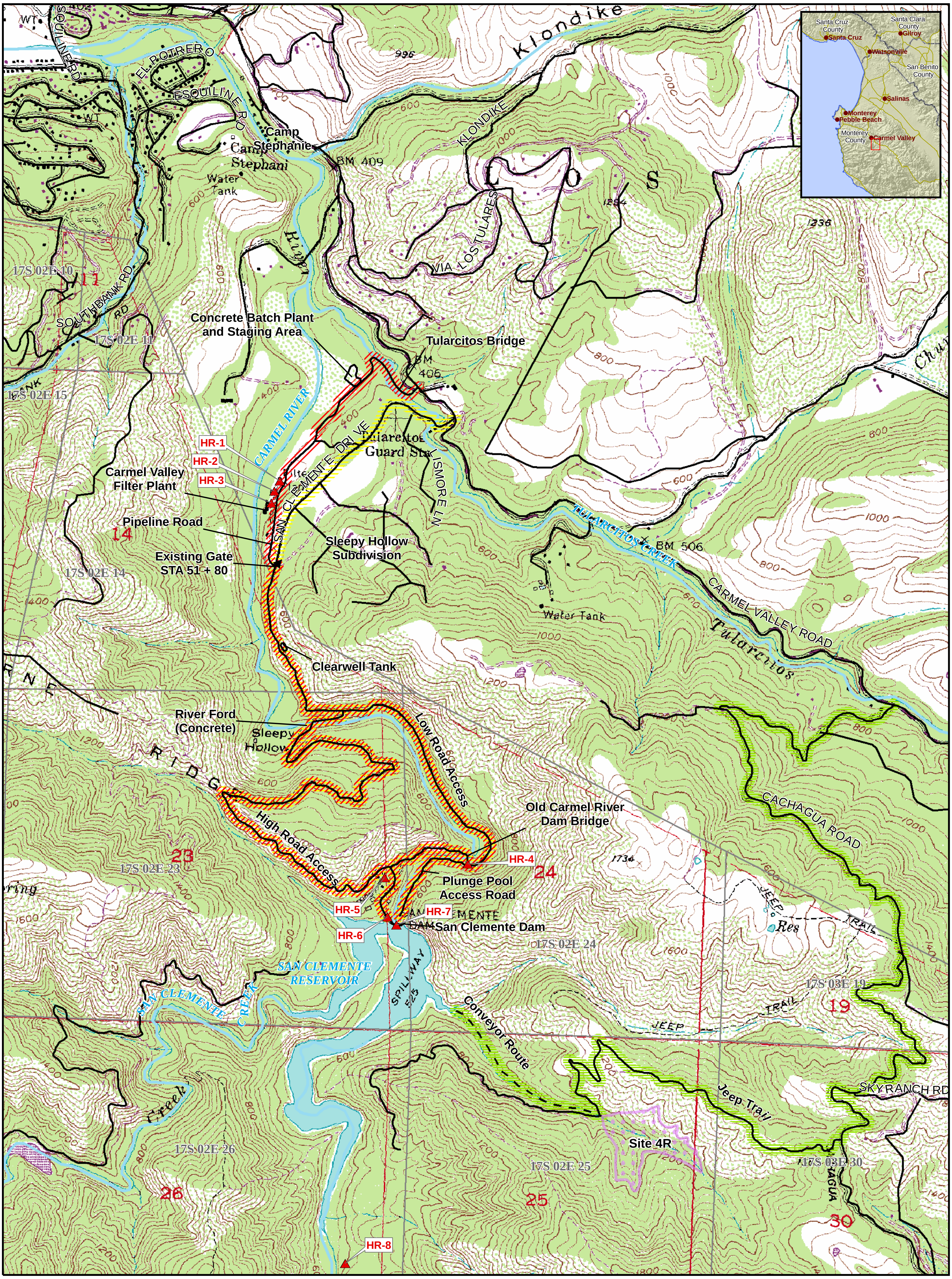

Legend

Access Routes

- Cachugua / 4R
- Sleepy Hollow
- Tularcitos
- Stream
- Existing Road
- Proposed Road
- Sediment Disposal Site
- Historical Resource
- Public Land Survey Section

Projection: California State Plane, Zone IV
Datum: NAD 83 Units: Feet

San Clemente Dam EIS/EIR

Figure 4.10-2

Inventoried Historic Resources

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Complete avoidance of the sites during construction and maintenance could mitigate the impact to a level less than significant.

Due to the extent of siltation behind the SCD within the APE, the likelihood of encountering surface evidence of archaeological deposits during field surveys was very low. Based on our understanding of the surrounding area and the presence of two archaeological sites within the APE along low benches above the San Clemente River, it is considered likely that archeological sites are present below the deposited sediment near the original river channel. However, since there would be no excavation of the overlying sediment behind the SCD under the Proponent's Proposed Project, there would be no potential for such excavation to impact previously undiscovered archaeological resources.

MITIGATION

As portions of these sites within the APE are still intact, monitoring of construction activities at these sites is recommended to protect those portions from inadvertent damage. One site, CA-MNT-33A and B (AR-1), has been recommended eligible for listing on the NRHP. Site CA-MNT-1253 (AR-4) remains unevaluated. Under CEQA, complete avoidance of the sites during construction and maintenance could mitigate the impact to a level less than significant.

If avoidance is not possible at these sites, archaeological evaluation and/or historical documentation are recommended to achieve a less than significant level of impact.

Pursuant to 36 CFR 800.13, if historic properties are discovered or unanticipated effects on historic properties are found after completion of the Section 106 process, the agency official shall make reasonable efforts to avoid, minimize or mitigate adverse effects to such properties. If buried cultural resources are discovered during the course of project activities, construction operations would immediately stop in the vicinity of the find and the federal lead agency would be notified. At the discretion of the agency, the undertaking may proceed, provided reasonable efforts are implemented to minimize harm to the resource until a determination of significance can be made. Cultural resources include artifacts of stone, bone, wood, shell, or other materials, or features, such as hearths, structural remains, or dumps.

In order to complete the Section 106 process, the mitigation measures would need to be incorporated into a Memorandum of Agreement (MOA). The MOA would include details about when the work would be done and the responsible parties. The agencies involved in the development of the MOA include the USACE, the SHPO, the Tribe, and CAW. The mitigation measures that are assumed to be a part of the MOA include:

- A comprehensive monitoring program would be implemented to ensure protection of archaeological sites within and adjacent to the APE for the Proponent's Proposed Project. Construction activities would be monitored within 200 feet of site or as determined by a qualified professional archeologist. According to tribal interviews (pers. comm. Rudolph Rosales, Fred Nason July 20, 2005), the sediment disposal site may be an archaeologically sensitive area.

- For those areas not previously surveyed, particularly the sediment disposal site and the areas exposed by excavation behind the SCD, a monitoring program would be developed prior to construction as part of the MOA between SHPO and the consulting parties. Sediment removal would be monitored as excavation approaches intact native soils within 200 feet of the historic river channel.

- The archaeological monitoring program would include the following tasks:

  - Pre-construction assessment and construction training
  - Construction monitoring
  - Site recording and evaluation
  - Mitigation planning
  - Curation
  - Tribal discussion
  - Report of findings
  - Review and approve any erosion control and revegetation procedures in the vicinity of a known significant site prior to implementation of these procedures

Issue CR-2: Damage to Historic Structures from Construction-related Vibration

Construction-related vibration
Determination: ***less than significant with mitigation, short-term***

IMPACT

Construction activities could create temporary vibrations such that the Chemical Building near the Reservoir (HR-6), Dam Keeper's House 2 (HR-2), OCRD and associated Fish Ladder (HR-4), and the SCD and Associated Fish Ladder (HR-7) could be damaged due to the loosening of paint or mortar, cracking of mortar, breakage of windows, weakening of structural elements, and/or crumbling masonry. This impact is short-term. No long-term impacts are anticipated.

MITIGATION

Mitigation measures for this short-term impact would include using rigid support of excavation structures to minimize the movement of the ground.

Issue CR-3: Introduction of Short-term Dirt / Unintended Damage

Construction/demolition-related accumulation of dirt
Determination: ***less than significant with mitigation, short-term***

IMPACT

The accumulation of dirt on all contributing historic properties in the historic district, including the Chemical Building near Filtration Plant (HR-1), Dam Keeper's House 2 (HR-2), OCRD and associated Fish Ladder (HR-4), Dam Keeper's House 1 (HR-5), Chemical Building near Reservoir (HR-6), and the SCD and Associated Fish Ladder (HR-7), could result from construction activities and alteration/demolition of resources. This is a short-term impact. No long-term impacts are anticipated.

MITIGATION

Short-term dirt/unintended damage could occur to contributing historic properties within the historic district (Chemical Building HR-1, Dam Keeper's House 2 HR-2, Carmel River Dam HR-4, Dam Keeper's House 1 HR-5, Chemical Building HR-6, and SCD and Fish Ladder HR-7). Mitigation measures for this short-term impact would include reducing dust associated with construction activities by spraying water on the ground surface prior to ground disturbance. Section 4.7 Air Quality provides a more detailed discussion of dust reducing mitigation.

Issue CR-4: Demolition or Alteration to Historic Properties

Alterations to OCRD and associated fish ladder and to San Clemente Dam
Determination: ***significant, unavoidable, long-term***

IMPACT

The OCRD and Associated Fish Ladder (HR-4) would undergo alteration of property due to proposed improvements to access roads to SCD. The Proponent's Proposed Project would require structural improvements to the existing bridge that is placed on top of the embankment dam. The Proponent's Proposed Project would replace existing piers with stronger and more deeply set piers, which would alter the OCRD. The thickening of the SCD would modify the SCD and Associated Fish Ladder (HR-7). The original engineering design of the bridge would be altered through the application of approximately 8 feet of concrete on the east end of the downstream side of the Dam. This would result in a change to the Dam and fish ladder due to the alteration of a historic property. This is a significant and unavoidable long-term impact.

MITIGATION

In order to complete the Section 106 process, the mitigation measures would need to be incorporated into a MOA. The mitigation measures that are assumed to be included in the MOA are as follows.

- Mitigation measures for long-term impacts would include recordation of the resources (OCRD and associated Fish Ladder (HR-4) and the SCD and associated Fish Ladder (HR-7)). Recordation would be completed prior to any construction, in the form of an HABS/HAER level documentation, which follows NPS regulations.

- Additional mitigation could include interpretive displays, development of an educational program on the Dam and associated facilities, and professional publications on the historic resources.

While this mitigation is necessary to complete the Section 106 process, the mitigation measures would not reduce the impact to a less than significant level.

Issue CR-5: Alteration of Surrounding Environment

Alter character of setting for San Clemente Dam Historic Resource District
Determination: ***significant, unavoidable, long-term***

IMPACT

The Proponent's Proposed Project impacts for Issue CR-5 affect specific contributing resources, such as the OCRD (HR-4) and the SCD (HR-7), as stated above, would result in alteration to the character of the setting of significant historic resources of the SCD Historic District (HR-9). This is a significant and unavoidable long-term impact.

MITIGATION

Mitigation measures for long-term impacts include preparation of a National Register of Historic Places Nomination Form for the SCD Historic District (HR-9) and the completion of a Historic Preservation Management Plan, included in a MOA. However, this mitigation could not reduce the impact to a less than significant level.

Issue CR-6: Introduction of Visual Obstructions

Loss of visual integrity for San Clemente Dam Historic Resource District
Determination: ***significant, unavoidable, long-term***

IMPACT

Visual effects to the SCD Historic District (HR-9) and the alteration/demolition of individual historic resources within the district would adversely affect their visual integrity. This is a significant and unavoidable long-term effect.

MITIGATION

Mitigation measures for long-term impacts include photographic documentation of the historic resources prior to construction. Design, materials, and construction methods that are compatible with existing historic resources could be chosen to reduce visual impacts to the SCD Historic District (HR-9). However, this mitigation could not reduce the impact to a less than significant level.

Alternative 1 (Dam Notching)

The impacts and mitigation measures described for CR-2 (Damage to Historic Structures from Construction-Related Vibration), CR-3 (Introduction of Temporary Dirt/Unintended Damage), CR-5 (Alteration to the Setting of Surrounding Environment), *and CR-6 (Introduction of Visual Obstructions) would be the same as the Proponent's Proposed Project.*

Issue CR-1: Ground Disturbance

Disturbance to archaeological sites
Determination: ***less than significant with mitigation, long-term***

IMPACT

Impacts and mitigation measures for Cultural Resources Issue would be the same as the Proponent's Proposed Project, with the addition of the potential for impacts arising from the effects to previously undiscovered archaeological resources from sediment excavation in the river channel and disposal at Site 4R.

The sediment disposal site 4R should be considered moderately sensitive for the presence of archaeological resources. Due to heavy brush and poison oak coverage, the area could not be effectively surveyed during the field season.

MITIGATION

As described for the Proponent's Proposed Project, the Applicant will complete the Section 106 process, prepare a MOA, and conduct archaeological monitoring during clearing and grubbing of the site and during any subsurface excavation prior to disposal activities.

Issue CR-4: Demolition or Alteration to Historic Properties

Alterations to OCRD and associated fish ladder and to San Clemente Dam
Determination: ***significant, unavoidable, long-term***

IMPACT

The OCRD and Associated Fish Ladder (HR-4) would be altered, as described for Issue CR-4 under the Proponent's Proposed Project. Notching SCD would also alter the SCD and Associated Fish Ladder (HR-7). This would entail removing a portion of the existing spillway bay as well as the gates, piers and walkway at the top of the Dam. Those changes would result in a change to the Dam and associated fish ladder due to alteration of the property. This would be a significant and unavoidable long-term impact.

MITIGATION

Mitigation measures for long-term impacts would include recordation of the resources (OCRD and associated Fish Ladder (HR-4) and the SCD and associated Fish Ladder (HR-7)). Recordation would be completed prior to any construction, in the form of an HABS/HAER level documentation, which follows NPS regulations. Additional mitigation could include interpretive displays, development of an educational program on the Dam and associated facilities, and professional publications on the historic resources. All mitigation would be outlined in a MOA and approved by SHPO. However, this mitigation would not reduce the impact to a less than significant level.

Alternative 2 (Dam Removal)

The impacts and mitigation measures described for Issues CR-1 (Ground Disturbance would be the same as Alternative 1. The impacts and mitigation measures described for CR-2 (Damage to Historic Structures from Construction-Related Vibration, CR-3 (Introduction of Temporary Dirt/Unintended Damage), CR-5 (Alteration to the Setting of Surround Environment), and CR-6 (Introduction of Visual Obstructions) would be the same as the Proponent's Proposed Project.

Issue CR-4: Demolition or Alteration to Historic Properties

Alterations to OCRD and associated fish ladder and to San Clemente Dam
Determination: ***significant, unavoidable, long-term***

IMPACT

The OCRD and Associated Fish Ladder (HR-4) could undergo alteration of property due to proposed improvements to access roads to SCD. Structural improvements would be made to the existing bridge that is placed on top of the embankment dam. Existing piers would be replaced with stronger and more deeply set piers, which could damage the OCRD. The SCD and Associated Fish Ladder (HR-7) would be demolished under this alternative. This would be a significant and unavoidable long-term impact.

MITIGATION

Mitigation measures for long-term impacts would include recordation of the resources (OCRD and associated Fish Ladder (HR-4) and the SCD and associated Fish Ladder (HR-7)). Recordation would be completed prior to any construction, in the form of an HABS/HAER level documentation, which follows NPS regulations. Additional mitigation could include interpretive displays, development of an educational program on the Dam and associated facilities, and professional publications on the historic resources. All mitigation would be outlined in a MOA and approved by SHPO. However, this mitigation would not reduce the impact to a less than significant level.

Alternative 3 (Carmel River Reroute and Dam Removal)

The impacts and mitigation measures for Issues CR-2 (Damage to Historic Structures from Construction-Related Vibration, CR-3 (Introduction of Temporary Dirt/Unintended Damage), CR-5 (Alteration to the Setting of Surround Environment), and CR-6 (Introduction of Visual Obstructions) would be the same as described for the Proponent's Proposed Project. The impacts and mitigation measures for Issue CR-4 (Demolition or Alteration to the Historic Properties) Obstructions would be the as same described for Alternative 2.

Issue CR-1: Ground Disturbance

Disturbance to archaeological sites
Determination: ***less than significant with mitigation, long-term***

IMPACT

Impacts and mitigation measures for Cultural Resources Issue would be the same as the Proponent's Proposed Project, except for the area described as the "saddle". Activities involving the "saddle" (the peninsula of land bordered to the east, north and west by the reservoir) could damage or destroy buried deposits in CA-MNT-1253 (BRM features) (AR-4), which has not been tested. A Testing Plan would need to be developed for this site prior to construction. Once the testing is completed, an NRHP determination of eligibility (DOE) would be completed. The outcome of the DOE will determine whether additional mitigation measures would be necessary.

MITIGATION

As described for the Proponent's Proposed Project, the Applicant will complete the Section 106 process, prepare a MOA, and conduct archaeological monitoring during clearing and grubbing of the site and during any subsurface excavation prior to disposal activities.

Mitigation measures for impact issue CR-1 would be the same as the Proponent's Proposed Project, except for the area described as the "saddle". Activities involving the "saddle" (the peninsula of land bordered to the east, north and west by the reservoir) could damage or destroy buried deposits in CA-MNT-1253 (BRM features) (AR-4), which has not been tested. If the site is eligible for the NRHP, avoidance would be the best form of mitigation. If avoidance is not possible, data recovery of the site could be required.

Alternative 4 (No Project)

None of the impact issues identified for the Proponent's Proposed Project and other action alternatives would apply to Alternative 4. No actions would occur that affect cultural resources in the Project Area.

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4.11 AESTHETICS

This section describes the visual quality effects of the Proponent's Proposed Project and its alternatives during construction and operations for the project site, maintenance areas and immediate surroundings. Additional information provided in this Final EIR/EIS clarifies and amplifies the information included in the Draft EIR/EIS. The visual analysis describes short- and long-term changes to the visual environment that would result from construction and operation of the Dam, reservoir, and associated infrastructure.

4.11.1 ENVIRONMENTAL SETTING

San Clemente Dam (SCD) and Vicinity

SCD is located in a steep-sided section of the Carmel River in the upper reaches of the Carmel River watershed. The existing reservoir created by the Dam occupies a portion of the Carmel River canyon and several side canyons formed by tributary streams. The north facing canyon slopes are covered with oaks while the south facing slopes are chaparral-covered. Presently, the most prominent visual features of the viewshed are the steep canyons and ridges, the existing SCD, and the reservoir that it forms. The reservoir is largely filled with sediment, which consists primarily of sandy gravel and sand. The finer-grained sediment is located nearest to the Dam in both arms of the reservoir (see Figure 4.11-1).

The SCD is a concrete arch dam that spans the canyon. the Dam is 106 feet high and 300 feet long. The reservoir surface elevation varies seasonally, revealing bare soil between the high water mark and water surface. the Dam is accessed by a gated, two-track dirt road. The road between the OCRB and the Dam traverses the canyon edges, with dense vegetation on either side of the road. A residence (former damkeeper's cottage) is located in close proximity to and northeast of the Dam.

***Figure 4.11-1**: Looking south towards reservoir from gated dam access road.*
Photo credit: ENTRIX, Inc.

Tularcitos Access Route / Concrete Batch Plant Site

The area is vegetated with a mix of deciduous trees, pines, and low-lying shrubs (see Figure 4.11-2). The vegetation is most dense around the Carmel River and Tularcitos Creek. Steep hills are located to the east and west of the proposed access road, with residences on the hills to the northeast and south of the route (see Figure 4.11-3). The hills are covered with trees, with some areas of low-lying shrubs. The 1.7-acre concrete batch plant site is an open grassy area populated with deciduous and evergreen trees and low-lying vegetation. Electrical wires on wood poles traverse the site. A CAW-owned residence is located immediately north of the CVFP along the Tularcitos Route. The road is paved adjacent to the CVFP site and in front of the residence.

Figure 4.11-2*: Concrete Batch Plant Site, looking SE. Photo credit: ENTRIX, Inc.*

Figure 4.11-3*: View of Concrete Batch Plant Site from Residences on Via Los Tulares, looking SW. Photo credit: ENTRIX, Inc.*

Cachagua Access Route

The area is remote, accessible only by a locked, gated dirt access road (Jeep Trail) off of Cachagua Road. The Jeep Trail leads to the conveyor route and descends in gradual switchbacks into the canyon. The Jeep Trail leads to a historic Stone Cabin (referred to HR-8 in Section 4.10, Cultural Resources), located at the south end of the reservoir on the west bank of the Carmel River. Sediment has encroached on portions of the Carmel River in the vicinity of the Stone Cabin (see Figures 4.11-4 and 4.11-5). The Stone Cabin is owned by a group of private landowners. The vegetation at the sediment disposal site is dense with a mix of deciduous and evergreen trees and low-lying shrubs and vegetation (see Figure 4.11-6). Some residences are located along Cachagua Road; however, the concrete batch plant site is not visible to the residences due to the distances of the residences from the site and the topography.

Figure 4.11-4*: View of Carmel River by private landowner's cabin in the Project Area, looking NW. Photo credit: ENTRIX, Inc.*

***Figure 4.11-5**: View of sediment adjacent to Carmel River, looking NW.*
Photo credit: ENTRIX, Inc.

***Figure 4.11-6**: Jeep Trail off Cachagua Road, looking NW. Photo credit: ENTRIX, Inc.*

Conveyor Route / Sediment Disposal Site

The conveyor route is densely vegetated and located at the base of the steep canyon below the Jeep Trail (see Figure 4.11-7). The sediment disposal site is located adjacent to the Jeep Trail and is populated with a mix of well-spaced tall trees filled in with lower-lying vegetation (see Figure 4.11-8). Dense vegetation surrounds the sediment disposal site on all sides.

Figure 4.11-7*: From the Jeep Trail looking NW to conveyor route. Photo credit: ENTRIX, Inc.*

***Figure 4.11-8**: Looking SE at sediment disposal site from Jeep Trail. Photo credit: ENTRIX, Inc.*

San Clemente Drive

Access to the Dam is via San Clemente Drive, which ends at a locked CAW gate. San Clemente Drive is a gated, paved road with large-lot residences on either side (see Figures 4.11-9, 4.11-10, and 4.11-11. The access route from the CAW gate to the Dam is a two-track dirt road. There is relatively dense vegetation on either side of the dirt access road. Existing access routes are through the residential community of Sleepy Hollow, which is located north of the Dam along San Clemente Drive. The houses in the community are positioned far from the street on large lots. Residences are also located along the southwest facing slopes of the canyon above and east of Carmel Valley Road. In general, many of the natural features and patterns are attractive and interesting, but they are not visually distinctive or unusual within the region.

***Figure 4.11-9**: House along San Clemente Drive in Sleepy Hollow Subdivision, looking SE*

***Figure 4.11-10**: View from Sleepy Hollow Subdivision looking toward the concrete batch plant location, looking NW. Photo credit: ENTRIX, Inc.*

***Figure 4.11-11**: View from the concrete batch plant location looking towards Sleepy Hollow Subdivision, looking SE. Photo credit: ENTRIX, Inc.*

2030 Baseline Conditions

Few to no changes are expected to the environmental setting through 2030.

4.11.3 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

Under CEQA, a project would normally have a significant effect on the environment if it would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings;

- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

Impact Assessment Methodology

Access to the Project Area is currently available only to CAW staff and a group of private landowners of the Stone Cabin. Portions of the Project Area are either owned by the Monterey Peninsula Regional Park District (MPRPD) or conveyed under easement to the MPRPD (see Figure 4.11-12 for resource viewpoints). This land is currently closed to public access pending the development of a management plan. The plan would contain a public access plan of the MPRPD-owned land in the Project Area (pers. comm. Tim Jensen 2006). CAW will not restrict future public access to the riverfront on any Park-owned or privately-owned land in the Project Area. Since there is no current public access to the MPRPD-owned land in the Project Area, visual impacts were not assessed for park users and therefore photo simulations (pre- and post-project photographs) were not included with the visual assessment.

Effects on visual resources may be caused by the changes in the viewsheds to viewer user groups in proximity to the Project Area. The user groups identified with this project include: residents on the hills east and above Carmel Valley Road; residents in the houses in close proximity to the CVFP and SCD; residents in the Sleepy Hollow subdivision; and private landowners who have access to the historic Stone Cabin at the south end of the reservoir. The visual resources issues that are associated with changes to the Dam include:

- Residential views on hills east of Carmel Valley Road.
- Changes to the viewsheds from residences adjacent to the CVFP and the SCD.
- Changes to the viewsheds from residences in Sleepy Hollow subdivision.
- Changes to the Viewsheds from the Stone Cabin.
- Changes to the Viewshed from the Jeep Trail.

Photographs of key viewsheds in the Project Vicinity were taken to ascertain any changes in visual quality. The location and direction of these photographs is included in Figure 4.11-12. The photographs included in this section are numbered and correspond to the photo numbers on Figure 4.11-12. Viewer user groups not included in the visual analysis are the operations and management staff of CAW and public recreationists (due to no public access).

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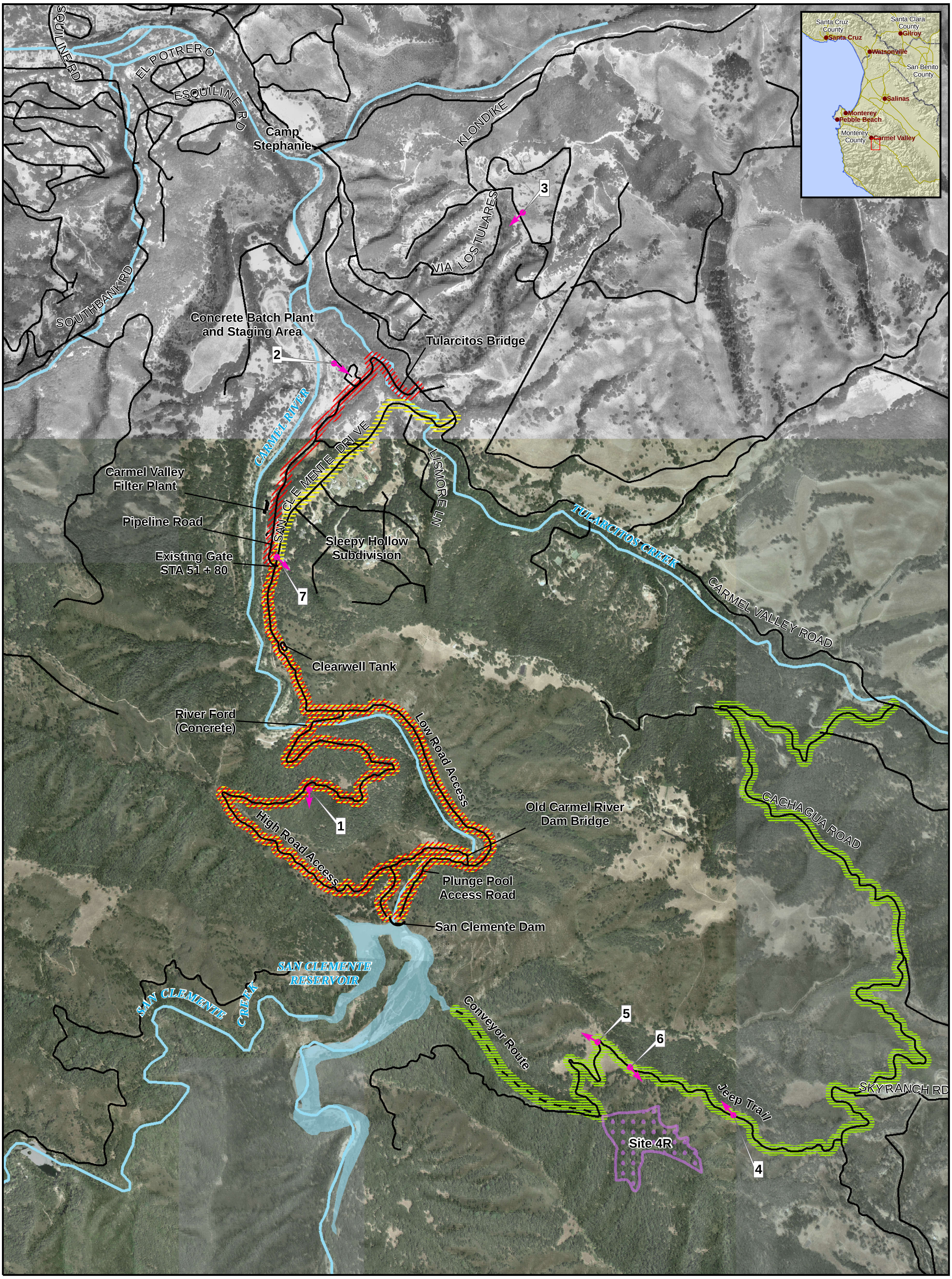

Legend

Access Routes

- Cachugua / 4R
- Sleepy Hollow
- Tularcitos
- Stream
- Reservoir
- Existing Road
- Proposed Road
- Sediment Disposal Site
- Viewpoint/Direction

04/08/05
Projection: California State Plane, Zone IV
Datum: NAD 83 Units: Feet

San Clemente Dam EIS/EIR

Figure 4.11-12

Resources Viewpoints

0 0.15 0.3 0.6
Miles

N

D:\GIS\entrix\3018605\map\SC_VisViewpoints_17i11i_02.mxd 6/27/2007 9:36:51 AM Mukhtyar

ENTRIX planners conducted an additional visual resources field reconnaissance of the Sleepy Hollow subdivision on August 10, 2006. Visual impacts were assessed and photographs were taken from residential streets in the subdivision (see Figures 4.11-10 Figure 4.11-11). Planners did not have access to the interiors of Sleepy Hollow residences; therefore, no visual impacts were assessed from inside the residences.

ENTRIX planners also conducted a visual resources field reconnaissance to the Stone Cabin on August 10, 2006. They took photographs of the riverfront in the vicinity of the cabin, showing where sediment had encroached on portions of the river (see Figures 4.11-4 and 4.11-5).

4.11.3 IMPACTS AND MITIGATION

The following impact issues have been defined for visual quality:

- VQ-1: Residential Views on Hills East of Carmel Valley Road (operation of construction equipment within the viewshed)
- VQ-2: Changes to Viewsheds from Residences Adjacent to CVFP and SCD (construction activities within the viewshed)
- VQ-3: Residential Views from Sleepy Hollow (operation of construction equipment within the viewshed)
- VQ-4: Changes to Viewsheds from the Stone Cabin (construction activities within the viewshed of the Carmel River)
- VQ-5: Changes to Viewsheds from the Jeep Trail (construction activities within the viewshed)

Proponent's Proposed Project (Dam Thickening)

Issues VQ-4 and VQ-5 would not apply to the Proponent's Proposed Project.

Issue VQ-1: Residential Views on Hills East of Carmel Valley Road

Operation of construction equipment within the viewshed
Determination: ***less than significant, no mitigation required, short-term***

IMPACT

The viewsheds of the residences on the hills east of Carmel Valley Road (northeast and south of the proposed Tularcitos Access Route) would be disrupted during construction of the Tularcitos Access Route and subsequently by the use of heavy construction equipment at the concrete batch plant site during normal working hours. Short-term impacts would be less than significant because construction would occur at a long distance from the residences on the hills east of Carmel Valley Road and would occur during normal work hours. After construction, the viewshed would return to the condition it was in prior to the construction. Normal CAW operations and maintenance activities would occur following construction. Therefore, no long-term impacts are anticipated.

MITIGATION

Because the activities associated with the disruption of the viewsheds would be short-term and would only occur during regular working hours, no short-term mitigation measures would be necessary. Use of the access road after construction would be intermittent; therefore, no long-term mitigation measures would be necessary.

Issue VQ-2: Changes to the Viewsheds from Residences Adjacent to the CVFP and the San Clemente Dam

Construction activities within the viewshed
*Determination**: less than significant, no mitigation required, short-term***

IMPACT

The residences located adjacent to the CVFP and the Dam would have views of the construction activities during normal working hours. Short-term impacts would be less than significant because construction would occur during normal work hours. Due to the location of these residences, dam operations and maintenance activities are routine features of the landscape.

Normal operations and maintenance activities would occur following construction. After construction, the viewshed would return to the condition it was prior to the construction. Therefore, no long-term impacts are anticipated.

MITIGATION

Because the activities associated with the disruption of the viewsheds are short-term and would only occur during regular working hours, no short-term mitigation measures are necessary. Use of the access road after construction would be for normal dam operations and maintenance activities; therefore, no long-term mitigation measures are necessary.

Issue VQ-3: Residential Views from Sleepy Hollow

Operation of construction equipment and ancillary facilities within the viewshed
*Determination **significant, unavoidable, short-term***

IMPACT

The concrete batch plant location is not visible from the residential streets in the subdivision, due to the topography and dense vegetation (e.g., tall trees). Residents have stated that it would be visible from two residences in the subdivision, but field reconnaissance did not confirm this.[1] The concrete batch plant would be a temporary

[1] Field surveyors did not have access to residences to view the batch plant site from upper stories. Judging visibility from the street level and considering screening vegetation, the site would not be visible.

structure that will be removed within one year of its construction. The distance of the concrete batch plant from the Sleepy Hollow Subdivision is approximately 2,500 feet. This distance, coupled with obstructions from vegetation, would lessen the concrete batch plant visual impacts to Sleepy Hollow. Visual impacts would be short-term and construction-related and no long-term visual effects would occur as a result of the batch plant to Sleepy Hollow homeowners. Although the batch plant would be some distance from the two residences and the impact would be short-term, it is difficult to say with certainty that the impacts would be less than significant.

MITIGATION

The batch plant requires a level area approximately five acres (about 218,000 square feet) in size with good road access in order to move in/out the larger pieces of batch plant equipment and aggregate materials. This limits possible sites for the batch plant to generally near Carmel Valley Road, and not up the canyon closer to the Dam due to mountainous terrain and narrow, winding access roads. There is a smaller site closer to the Dam, but it would not be large enough for large trucks to turn around; therefore, it would not be not technically feasible to locate the batch plant closer to the Dam. In addition, the proximity of electric power lines may avoid the use of diesel generators for batch plant operation, thus avoiding emissions of NO_X, CO, ROC, SO_2 , and diesel fine particulate (PM_{10}).

There are no mitigation measures available. The batch plant would be removed after one year.

Alternative 1 (Dam Notching)

Visual Quality Issue VQ-1 (Residential Views on Hills East of Carmel Valley Road) does not apply to Alternative 1 (Tularcitos access is developed only for the Proponent's Proposed Project and the concrete batch plant applies only to the Proponent's Proposed Project). Impacts and mitigation measures for VQ-2 (Changes to Viewsheds from Residences Adjacent to CVFP and SCD) would be the same as the Proponent's Proposed Project.

Issue VQ-3: Residential Views from Sleepy Hollow

Operation of construction equipment and ancillary facilities within the viewshed
Determination: ***less than significant, no mitigation required, short-term***

IMPACT

The residences in the Sleepy Hollow Subdivision would have disrupted viewsheds during regular hours of construction from the heavy equipment using San Clemente Drive to get to the Dam access road. This would be a short-term impact. This alternative does not include the construction or operation of a batch plant. Normal operations and maintenance activities would occur following construction; therefore, no long-term impacts are anticipated. Under CEQA, this would be a less than significant impact.

MITIGATION

Because the activities associated with the disruption of the viewsheds would be temporary and would only occur during regular working hours, no short-term mitigation measures would be necessary. Use of the access road after construction would be intermittent and would include normal operations and maintenance activities; therefore, no long-term mitigation measures would be necessary.

Impact VQ-4: Changes to Viewsheds from the Stone Cabin

Construction activities within the viewshed of the Carmel River
Determination: ***less than significant, short-term; beneficial, long-term***

IMPACT

During construction, it is possible that restoration of the creek may lead to removal of sediment in the area near Stone Cabin. Construction would occur during daytime working hours. Construction vehicles would be removed from the Jeep Trail in the vicinity of the Stone Cabin during nonworking hours. Part or all of the Carmel River/San Clemente Creek in the reaches viewed by the Stone Cabin would be restored as a free-flowing stream, which would have a beneficial aesthetic effect in the long-term.

MITIGATION

Because the activities associated with the changes to the viewsheds would be short-term occurring only during the restoration construction and create a beneficial effect in the long-term, no mitigation measures would be required.

Impact VQ-5: Changes to Viewsheds from the Jeep Trail

Construction activities within the viewshed using the sediment disposal site
Determination: ***significant and unavoidable impact, short-term; less than significant with mitigation, long-term***

IMPACT

During construction, private landowners of the Stone Cabin would have views of the sediment disposal site adjacent to the Jeep Trail and the sediment conveyor overcrossing, which would be above the Jeep Trail. A relatively small segment of the sediment disposal site would be visible to the landowners traveling on the Jeep Trail for a short duration of travel time. The sediment conveyor overcrossing together with the sediment pile would substantially degrade the existing visual character or quality of the site and its surroundings during construction. This would be a short-term impact. Under CEQA, this would be a significant and unavoidable impact. After construction, the sediment disposal site would be vegetated, causing it to blend with the surroundings, and the sediment conveyor overcrossing would be removed. The access roads would be improved, but would still be dirt roads. Therefore, there would be no visual impact as a result of the road improvements. This would be a less than significant, long-term impact.

MITIGATION

Mitigation measures for short-term impacts would include screening the portion of the sediment disposal site adjacent to the Jeep Trail with vegetation during construction. Mitigation measures for long-term visual impacts would include vegetation of the sediment disposal site and the removal of the sediment conveyor overcrossing.

Alternative 2 (Dam Removal)

Visual Quality Issue VQ-1 (Residential Views on Hills East of Carmel Valley Road) would not apply, as Alternative 2 would have no impact on residential views on hills east of Carmel Valley Road. Impacts and mitigation for Issue VQ-2 (Changes to Viewsheds from Residences Adjacent to CVFP and SCD) would be the same as the Proponent's Proposed Project. Impacts and mitigation for Issues VQ-3 (Residential Views from Sleepy Hollow), VQ-4 (Changes to viewsheds from the Stone Cabin) and VQ-5 (Changes to viewsheds from the Jeep Trail) would be the same as Alternative 1.

Alternative 3 (Carmel River Reroute and Dam Removal)

Impacts and mitigation for Visual Quality Issue VQ-1 (Residential Views on Hills East of Carmel Valley Road) would not apply as Alternative 3 would have no impact on residential views on hills east of Carmel Valley Road. Impacts and mitigation for Issue VQ-2 (Changes to Viewsheds from Residences Adjacent to CVFP and SCD would be the same as the Proponent's Proposed Project. Mitigation for impacts resulting from Issue VQ-3 (Residential Views from Sleepy Hollow) would be the same as Alternative 2. The impacts and mitigation for Issue VQ-4 (Changes to viewsheds from the Stone Cabin) would be the same as Alternative 1. Issue VQ-5 (Changes to viewsheds from the Jeep Trail) would not apply as there would be no sediment disposal site adjacent to the Jeep Trail.

Alternative 4 (No Project)

The viewsheds from the residences east of Carmel Valley Road, the Sleepy Hollow Subdivision, those adjacent to the CVFP and the Dam, and the private landowners of the Stone Cabin would not be disrupted because large construction activities would not occur. Normal operations and maintenance activities would continue to occur. Therefore, there would be no visual impacts or mitigation required.

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4.12 RECREATION

The Draft EIR/EIS addressed recreation in a general chapter on "other environmental effects." In response to comments, the Recreation section has been created in this Final EIR/EIS to address potential recreation effects in more detail. This section describes the recreation effects of the Proponent's Proposed Project and its alternatives during construction and operations for the project site, maintenance areas and immediate surroundings. The recreation analysis describes short and long-term changes to the recreational facilities that would result from construction and operation of the Dam, reservoir, and associated infrastructure.

4.12.1 ENVIRONMENTAL SETTING

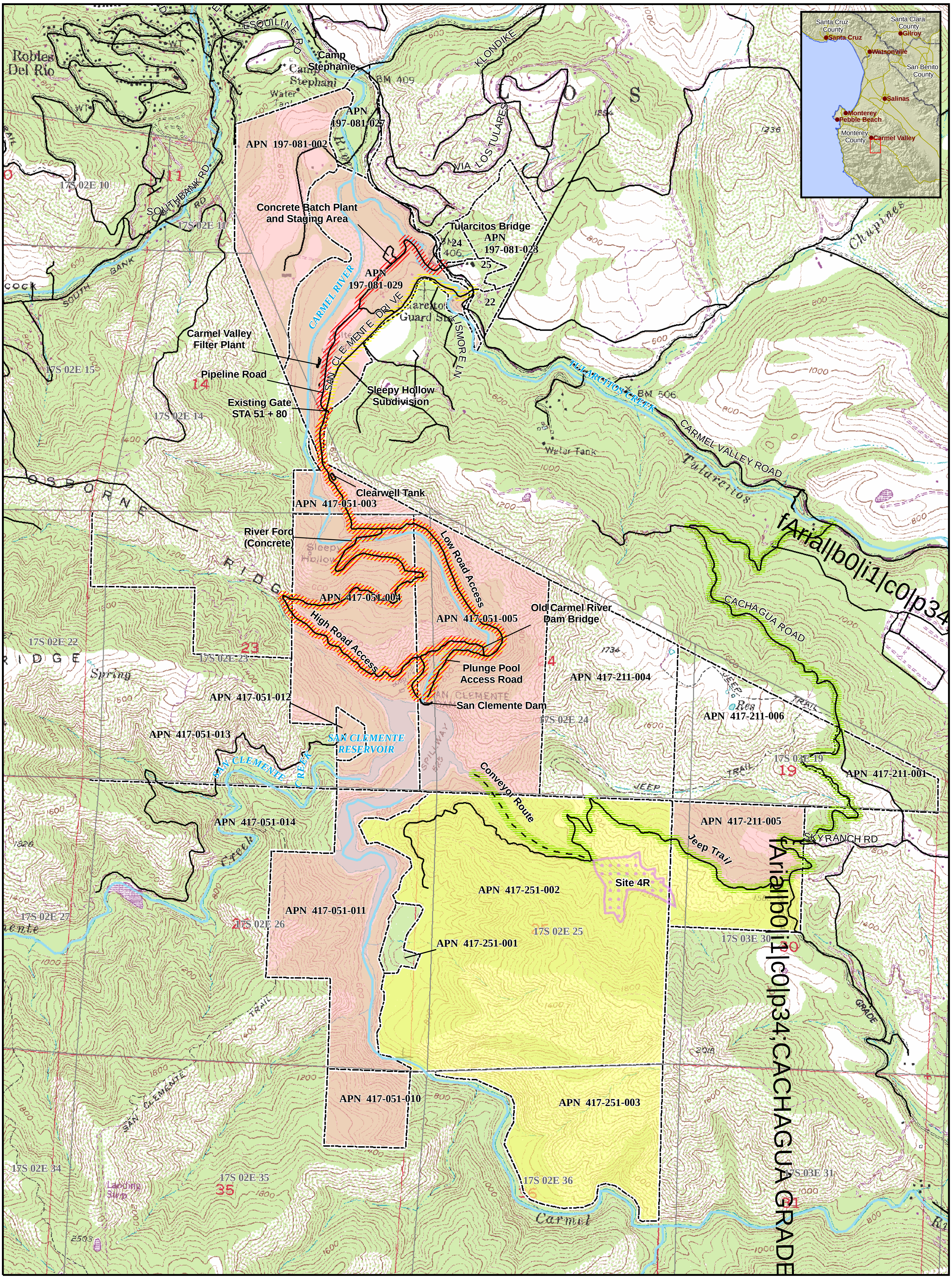
Recreational use of the Project Area is currently limited to access by a group of private landowners who own a remote Stone Cabin at the south end of the reservoir, on the west bank of the Carmel River (see Figure 4.12-1).

***Figure 4.12-1**: Looking south towards Stone Cabin from Jeep Trail Access Road.*
Photo credit: ENTRIX, Inc.

The historic Stone Cabin is referred to as HR-8 in section 4.10, Cultural Resources, of Chapter 4 and its location is marked in Figure 4.10-2 (Inventoried Historic Resources Map). Access to the cabin is via the Jeep Trail (i.e., 4WD road) and through a locked gate from Cachagua Road. The Carmel River channel is a short walking distance from the Stone Cabin (see Figure 4.12-2).

***Figure 4.12-2**: Looking east towards Carmel River channel in vicinity of Stone Cabin*
Photo credit: ENTRIX, Inc.

Portions of the Project Area are owned by the MPRPD or conveyed under easement by the owners of the Stone Cabin to the MPRPD (letter dated June 27, 2006 from Larry Horan). The location of the MPRPD-owned land is shown in Figure 4.12-3, Land Ownership. Garland Ranch Regional Park, which is owned by the MPRPD, is located immediately east of the Project Area. There is currently no public access to the MPRPD-owned land in the Project Vicinity. However, the MPRPD's ten-year planning horizon includes developing a management plan for the Project Area, which would include a public access plan (pers. comm. T. Jensen 08/04/06 and 08/10/07).



Legend
Access Routes

- Cachugua / 4R
- Sleepy Hollow
- Tularcitos
- Stream
- Existing Road
- Proposed Road
- Sediment Disposal Site
- Public Land Survey Section
- General Location of Property Boundaries

Land Owner

- CAW
- Monterey Peninsula Regional Park District

Projection: California State Plane, Zone IV
Datum: NAD 83 Units: Feet

San Clemente Dam EIS/EIR

Figure 4.12-3

Land Use

0 0.15 0.3 0.6
Miles
N

2030 Baseline

The MPRPD intends to complete a management plan for the park district-owned land in the Project Area within the next ten years. Stewardship of the land and public access would be included in the management plan. The MPRPD intends to provide public access for passive recreational use (e.g., mountain biking, hiking, etc.) in the MPRPD-owned lands in the Project Area. Eventually, the MPRPD would like to provide a connection, or greenbelt, between the public park land on adjacent properties (in the vicinity of the Los Padres Dam) with the park land in the Project Area through easements or other avenues on privately-owned and CAW-owned land (pers. Comm. T. Jensen 08/17/06 and 08/10/07).

4.12.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

Under CEQA, a project would normally have a significant effect on the environment if it will:

- Conflict with established recreational, educational, religious or scientific uses of the area.

Impact Assessment Methodology

The recreational user groups identified with this project include private landowners with access to the Stone Cabin at the south end of the reservoir. Access for this recreational user group is through a locked gate off Cachagua Road via the Jeep Trail. The MPRPD land in the Project Area is currently not accessible to the public; therefore, public park users were not included in the recreational user groups for this analysis. Impacts associated with access to the Carmel River for recreational purposes were not included because there is no public access to the river through the Project Area. The recreational issues that are associated with changes to the Dam include:

- Access to the Stone Cabin via the Jeep Trail (Alternatives 1 and 3)
- Deposition of sediment in Site 4R (Alternatives 1 and 2)
- Use of the Jeep Trail for construction purposes (Alternatives 1, 2, and 3)
- Rerouting and/or restoring the Carmel River channel (Alternatives 1, 2, and 3)

4.12.3 IMPACTS AND MITIGATION

The following impact issues have been defined for recreation:

- REC-1: Access to the Stone Cabin via the Jeep Trail (blocked by sediment disposal at Site 4R)
- REC-2: Disruption of Use of Jeep Trail to Stone Cabin (heavy equipment traversing Jeep Trail)
- REC-3: Rerouting or Restoring the Carmel River Channel (restore to the river to its original free-flowing state)
- REC-4: Deposition of Sediment on Site 4R (sediment disposal on parkland)

Proponent's Proposed Project (Dam Thickening)

Issues REC-1, REC-2, REC-3, and REC-4 would not apply to the Proponent's Proposed Project. Therefore, there would be no recreational impacts or mitigation measures required for the Proponent's Proposed Project.

Alternative 1 (Dam Notching)

Issue REC-1: Access to the Stone Cabin via the Jeep Trail

Sediment pile blocked access via the Jeep Trail under the design for Site 4R proposed in the Draft EIR/EIS
*Determination: **less than significant, no mitigation required, short-term***

IMPACT

Issue REC-1 was raised in the comments to the Public Draft EIR/EIS. Under the design in the Public Draft EIR/EIS, access to the Stone Cabin would have been blocked by use of the sediment disposal site (Site 4R). For the Final EIR/EIS, this alternative has been redesigned to relocate the sediment disposal site so that access the Stone Cabin would not be blocked. See Section 3.3 for more discussion on the access road and the sediment disposal site.

MITIGATION

The revised design for Site 4R avoids the impact. No mitigation is required.

Issue REC-2: Disruption of Use of Jeep Trail to Stone Cabin

Heavy equipment traversing Jeep Trail
*Determination: **significant, unavoidable, short-term***

IMPACT

During construction season (all year round of CY 3 and March – October in following seasons), there would be daily worker access via the Jeep Trail. Heavy earth moving and other construction equipment would occur at the beginning and end of each construction season for three seasons, averaging 2-3 loads per day for the first and last month of each construction season. This would be a short-term impact that is significant and unavoidable. No long term impacts are anticipated.

MITIGATION

Operation of heavy earth moving and other construction equipment would occur during normal working hours. Refer to Sections 4.7.3, 4.8.3, and 4.9.3 for a discussion of mitigation to air quality, noise, and traffic effects.

Issue REC-3: Rerouting or Restoring the Carmel River Channel

Restore the river to its original free-flowing state
Determination: ***beneficial impact, no mitigation required, long-term***

IMPACT

The river channel would be restored to a geomorphically stable condition (to its original free-flowing state in the reach from which sediment excavated). Therefore, this would provide a beneficial aesthetic and recreational effect.

MITIGATION

No mitigation measures are required because restoration of the river channel would create a beneficial impact.

Issue REC-4: Deposition of Sediment on Site 4R

Sediment disposal on parkland
Determination: ***significant, unavoidable, short term; less than significant with mitigation, long-term***

IMPACT

Approximately 1.5 million cubic yards of accumulated sediment would be removed over two seasons from the Carmel River channel by excavation with heavy equipment and deposited on Site 4R, which occupies land currently owned by or conveyed under easement to the MPRPD. This would occur over two seasons. Impacts include adding sediment to open space parkland. Impacts would be significant and unavoidable. Long-term effects on recreation would be reduced to a less than significant level with implementation of mitigation.

MITIGATION

Following construction, the sediment disposal site located on MPRPD-owned land would be fully restored to close to its pre-project state, including restoring the site with riparian habitat. The site would return to use as open space parkland.

Alternative 2 (Dam Removal)

The impacts and mitigation for Recreational Issues REC-1 (Access to the Stone Cabin via the Jeep Trail), REC-2 (Disruption of use of Jeep Trail to Stone Cabin), REC-3 (Rerouting or restoring the Carmel River channel), and REC-4 (Deposition of Sediment in Site 4R) would be the same as described for Alternative 1.

Alternative 3 (Carmel River Reroute and Dam Removal)

Recreational Issue REC-1 (Access to the Stone Cabin via the Jeep Trail) does not apply, as Site 4R would not be used under Alternative 3. The impacts and mitigation for REC-2 (Disruption of use of Jeep Trail to Stone Cabin) would be the same as described for Alternative 1. REC-3 (Rerouting or restoring the Carmel River channel) would be the same as described for Alternative 1, but the beneficial effect would extend through a longer reach, including the diversion bypass and restored San Clemente Creek channel around the Carmel River. REC-4 (Deposition of Sediment in Site 4R) would not apply, as there would be no sediment disposal at Site 4R.

Alternative 4 (No Project)

No construction is planned Alternative 4. Therefore, Impact Issues REC-1, REC-2, REC-3, and REC-4 would not apply. No recreational impacts or mitigation measures would be required for Alternative 4.

4.13 LAND USE

The Draft EIR/EIS addressed land use in a general chapter on "other environmental effects." In response to comments made during the public review, this new section was developed for this Final EIR/EIS to address land use in more detail. This section describes the land use effects of the Proponent's Proposed Project and its alternatives during construction and operations for the project site, maintenance areas and immediate surroundings. The land use analysis describes short and long-term changes to the land uses that would result from construction and operation of the Dam, reservoir, and associated infrastructure.

4.13.1 ENVIRONMENTAL SETTING

Land use in the Project Area consists of dam-related facilities (including two dams (SCD and OCRD); a filtration plant; two chemical buildings; two residences; and access roads); a privately-owned recreational site (Stone Cabin at the south end of the reservoir, on the west bank of the Carmel River); and park land, owned by or conveyed under easement to the MPRPD (see Figure 4.13-1). The Sleepy Hollow subdivision (residential community) is located on the east side of San Clemente Drive. Sediment Disposal Site 4R is currently owned by the MPRPD. At present, the park district has no plans or policies that would prevent use of Site 4R. Public access is currently closed to the Park-owned land in the Project Area. The park district, however, intends to create a management plan for all the MPRPD-owned land in the Project Area. The management plan would address land use of site 4R as well as stewardship of the land and access to the area (pers. comm. Tim Jensen 08/17/06).

The Dam-related facilities are owned by CAW. The Stone Cabin, listed as HR-8 in the San Clemente Dam Seismic Safety Project EIR/EIS Cultural Resources Section 4.10, is owned by a group of 10 individuals, all of whom have access to the gated Project Area. Public access is currently closed to all park district-owned land in the Project Area. See Figure 4.13-1 for a map of land ownership in the Project Area, and Figure 4.13-2 for a map showing the relationship of the Stone Cabin to project features. There is no prime agricultural land in the Project Area.

Adjacent land uses include the Garland Ranch Regional Park (northwest of Project Area); Carmel Valley Village (northwest of Project Area); Tularcitos Ridge residential subdivision (east of and on a ridge above the project); and Cachagua Community Park (southeast of Project Area).

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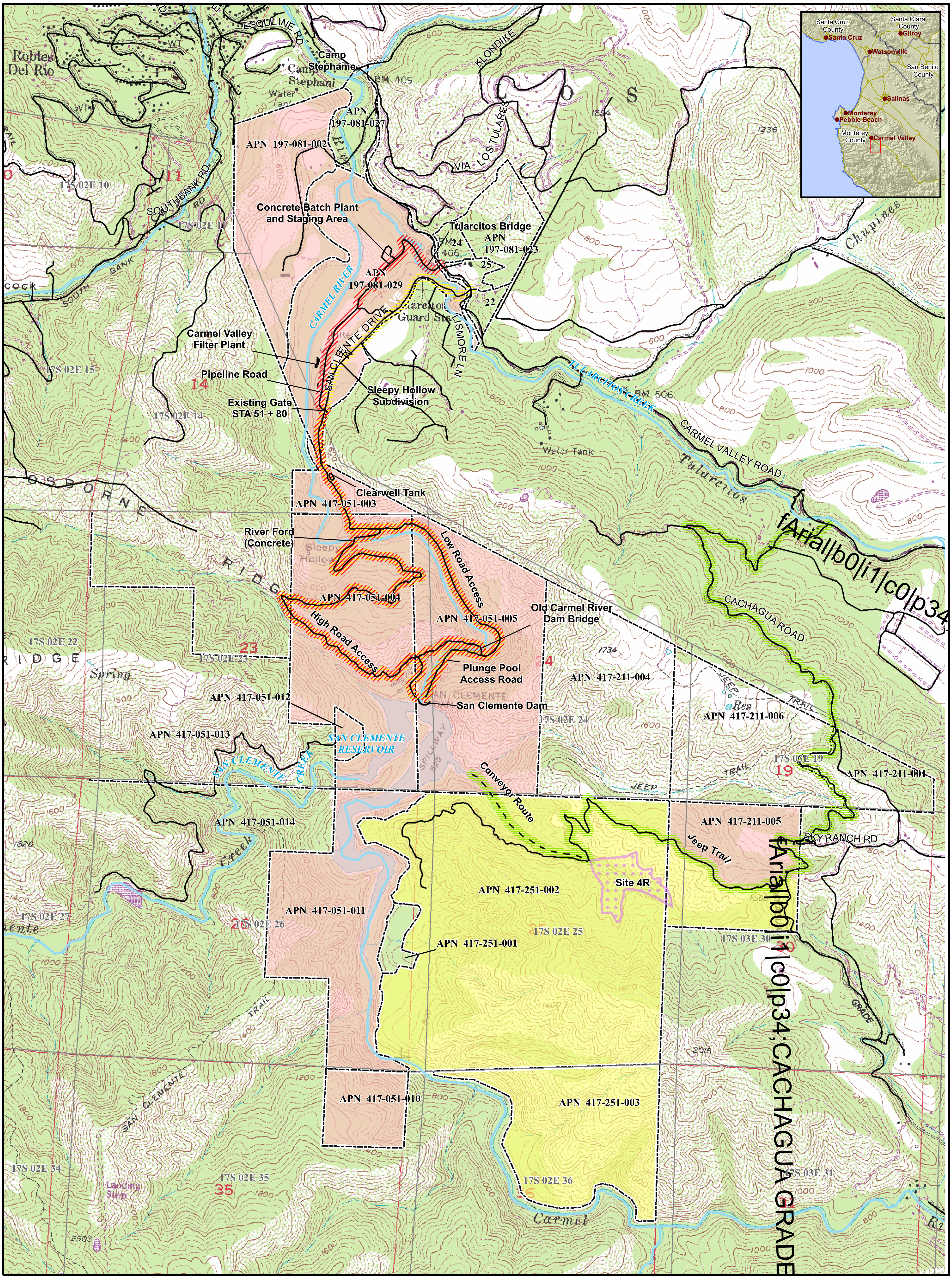


Legend		
Access Routes	Stream	General Location of Property Boundaries
Cachugua / 4R	Existing Road	Land Owner
Sleepy Hollow	Proposed Road	CAW
Tularcitos	Sediment Disposal Site	Monterey Peninsula Regional Park District
	Public Land Survey Section	

Projection: California State Plane Zone IV, Datum: NAD 83 Units: Feet

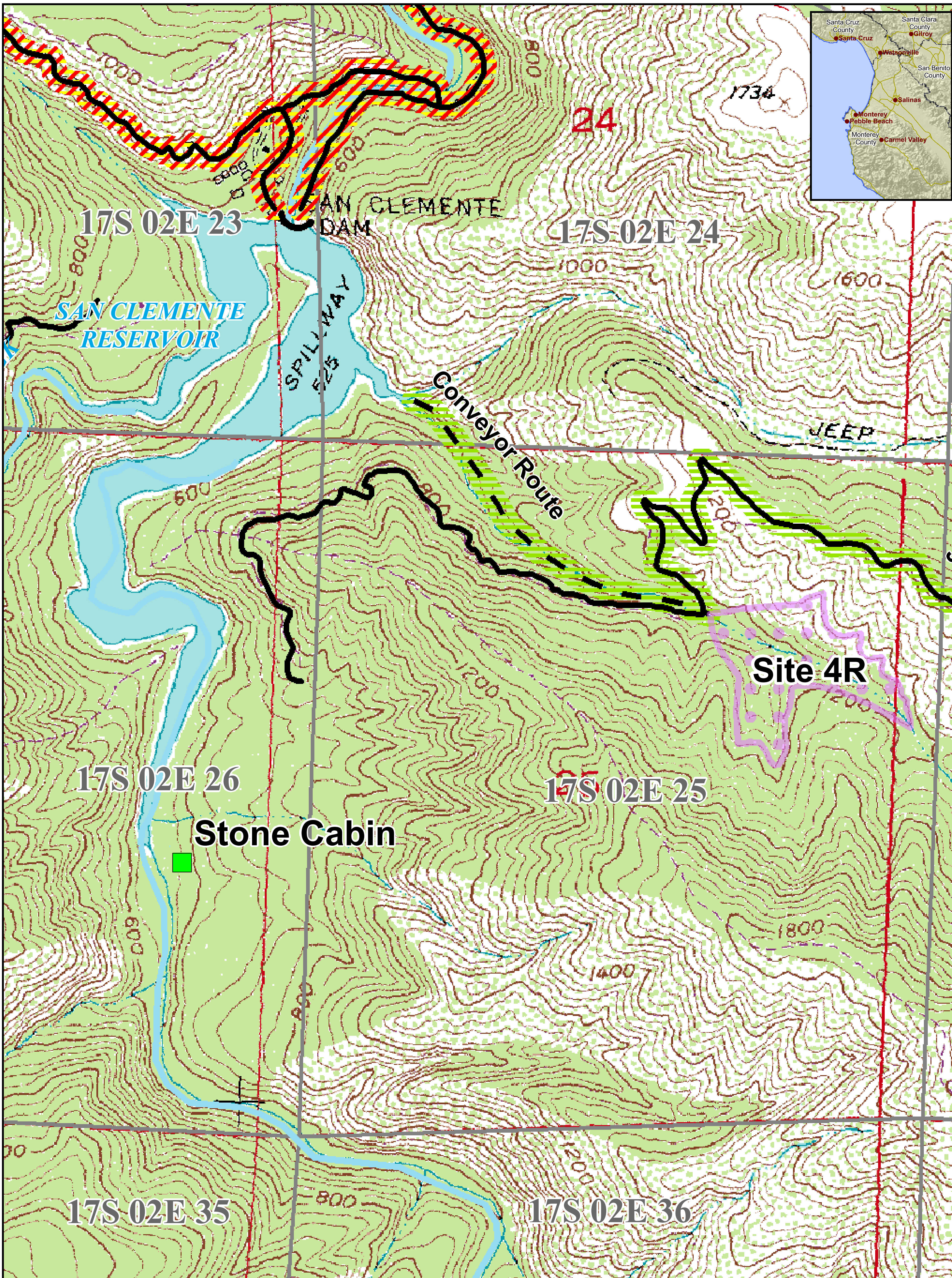
San Clemente Dam EIS/EIR

Figure 4.13-1

Land Ownership

0 0.15 0.3 0.6 Miles

N



Legend
Access Routes
Cachugua / 4R
Sleepy Hollow
Tularcitos
Stream
Existing Road
Proposed Road
Sediment Disposal Site
Public Land Survey Section

Projection: California State Plane, Zone IV
Datum: NAD 83 Units: Feet

San Clemente Dam EIS/EIR
Figure 4.13-2
Stone Cabin Project Features

0 0.05 0.1 0.2
Miles
N

2030 Baseline

The park district intends to complete a management plan for MPRPD-owned land in the Project Area. The park district anticipates providing public access for passive recreational use on their lands in the Project Area (e.g., mountain biking, hiking, etc.). Eventually, the park district would like to provide a connection between the public park land on adjacent properties with the park land in the Project Area through easements or other avenues on CAW-owned land (pers. Comm. T. Jensen 08/17/06).

4.13.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

Under CEQA, a project would normally have a significant effect on the environment if it will:

- Conflict with adopted environmental plans and goals of the community where it is located; and
- Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land.

Impact Assessment Methodology

Land uses were identified during a field reconnaissance to the Project Area. Land ownership data was obtained from CAW and the MPRPD. The land use issue that is associated with changes to the Dam includes:

- Compatibility of proposed land use changes with existing plans and policies

A Fire Prevention and Suppression Plan (Appendix Z) was created to identify measures to be taken by CAW and its contractors to ensure that fire prevention and suppression techniques are carried out in accordance with federal, state, and local regulations.

4.13.3 IMPACTS AND MITIGATION

The following impact issue has been defined for land use:

- LU-1: Conflict with Existing Plans and Policies in the Project Area (construction and operations changing the existing land use)

Proponent's Proposed Project (Dam Thickening)

Issue LU-1: Conflict with existing plans and policies

Construction and operations changing the existing land use
Determination: ***less than significant with mitigation, long term***

IMPACT

Construction and operation impacts would include grading, construction of a new access route from Carmel Valley Road (encroachment on county right-of-way); changes to land use (creation of new road and temporary batch plant); and tree removal.

MITIGATION

The Applicant would obtain the following permits from the Monterey County Planning and Building Inspection Department (MCPBID) for the proposed land use changes: Tree Removal Permit, Encroachment Permit; Use Permit; and Grading Permit. The MCPBID would provide a complete list of required permits when a project description and map are submitted as part of a pre-application appointment. Although land use would be changed at the batch plant site during construction, MCPBID permits would be obtained and permit conditions met. Therefore, long-term impacts would be less than significant. The land use at the batch plant site would be restored to close to pre-project conditions following construction.

The draft updated Monterey County General Plan includes a safety element (S-4.13) which states “The county shall require all new development to have adequate water available for fire suppression. The water system shall comply with Monterey County Code Chapter 18.56, National Fire Protection Association (NFPA) Standard 1142, or other nationally recognized standard. The fire authority having jurisdiction and the MCPBID, and all other regulatory agencies shall determine the adequacy and location of water supply and/or storage to be provided.” A fire suppression plan (Appendix Z) has been created to respond to this anticipated requirement.

Alternative 1 (Dam Notching)

Issue LU-1: Conflict with existing plans and policies

Construction and operations changing the existing land use
*Determination: **significant and unavoidable, short-term; less than significant with mitigation, long term***

IMPACT

Construction and operation impacts would include grading; changes to land use (sediment disposal on MPRPD-owned land); and tree removal.

The sediment disposal plan proposed in the Public Draft EIR/EIS would have blocked the Jeep Trail and restricted access to the Stone Cabin during construction. The revised plan proposed in this Final EIR/EIS is to relocate the site uphill and provide a conveyor overcrossing to allow access along the Jeep Trail to the Stone Cabin.

MITIGATION

The following permits from MCPBID would allow for the proposed land use changes: Tree Removal Permit, Encroachment Permit; Use Permit; and Grading Permit. The Monterey County Planning Department would provide a complete list of required permits when a project description and map are submitted as part of a pre-application appointment. Once these permits have been obtained and permit conditions met, the long-term impacts would be less than significant. The MPRPD board would review proposed mitigation regarding restoration of Site 4R and improvement to the Jeep Trail following construction activities. Short-term impacts to park district-owned land would be significant and unavoidable because land use would change from an open park to a sediment disposal site during construction. Long-term impacts to park district-owned land would be less than significant with mitigation because Site 4R would be restored to a condition similar to pre-project (riparian habitat) and, at the discretion of MPRPD, the Jeep Trail would be improved for parkland access. Section 4.5 Wildlife and Vegetation discussed riparian habitat in greater detail.

Alternative 2 (Dam Removal)

Land Use Issue LU-1 (Conflict with Existing Plans and Policies) would be the same as described for Alternative 1.

Alternative 3 (Carmel River Reroute and Dam Removal)

There would be no changes to land use under this alternative; Issue LU-1 (Conflict with Existing Plans and Policies) would not apply.

Alternative 4 (No Project)

Normal operations and maintenance activities would continue to occur. Therefore, there would be no land use impacts or mitigation measures required.

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4.14 ENVIRONMENTAL JUSTICE

This section describes environmental justice concepts and issues under NEPA related to federal actions in the Project Area. Under NEPA, social and economic impacts must be considered in an EIS (40 CFR 1508.8 [b]). Environmental Justice issues are of general interest to CEQA procedures but are not a central part of them. CEQA is primarily concerned with traditional physical environmental impacts. CEQA compliance generally does not require lead agencies to consider the purely economic or social effects of proposed projects, unless they relate to a physical change in the environment (CEQA Guidelines Section 15131).

In 1994, the President of the United States issued Executive Order (EO) 12898. "*Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*." The objectives of EO 12898 include identification of disproportionately high and adverse health and environmental effects on minority populations and low-income populations that could be caused by a proposed federal action. Accompanying EO 12898 was a Presidential Transmittal Memorandum that referenced existing federal statutes and regulations, including NEPA, to be used in conjunction with the EO. The Council on Environmental Quality (CEQ) issued *Guidance Under NEPA* in December 1997 (CEQ 1997).

Following the lead of EO 12898, California passed a series of environmental justice measures in 2001. These laws define environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations and policies." (California Government Code, Section 65040.12(e). Although federal and state environmental justice approaches differ somewhat, the underlying intention of both approaches is the fair and equal treatment of all races, cultures and incomes.

Consideration of environmental justice in NEPA documentation ensures that two questions are asked: (1) is a federal project with significant, adverse environmental impacts being proposed in a community comprised largely of minority or low-income persons, and (2) would any significant, adverse human health or environmental effects of the project disproportionately affect minority or low-income persons.

The federal government provides an official definition of poverty, but there is no officially accepted definition of low-income. Some definitions of "low-income" use the federally defined "poverty" level and another less strict definition based on households earning up to 50 percent more income than allowed under poverty definition (Table 4.14-1). Both definitions have the advantage of readily available data published by the U.S. Census Bureau.

Table 4.14-1: Low-Income Definitions

Household Size	Poverty Level (a)	150% Poverty Level
1 person	$8,500	$12,750
2 persons	$10,800	$16,200
3 persons	$13,290	$19,950
4 persons	$17,000	$25,500
5 persons	$20,000	$30,150

(a) Poverty level defined by federal government.

The United States Department of Housing and Urban Development (HUD) defines low-income by comparing annual income for various sized households to an area's median income. For California, the three-year average median household income for the years 2001-2003 is $48,979 (HUD 2005). HUD issues income guidelines for extremely low-income households (those with 30 percent or less of an area's median income), very low-income households (those with 50 percent or less of the area median income), and low-income households (those with 80 percent or less of the area median income). For California, a household income of $39,183 is defined as "low-income" (Table 4.14-2).

Table 4.14-2: Three-Year-Average Median Household Income in California: 2001-2003

Median Income	30% Median	50% Median	80% Median
$48,979	$14,694	$24,490	$39,183

Source: U.S. Department of Housing and Urban Development and U.S Census Bureau, 5/13/2005

Low-income population refers to any readily identifiable group of low-income persons who live in geographic proximity and, if circumstances warrant, geographically dispersed/ transient persons (such as migrant workers or Native Americans) who would be similarly affected by the Proponent's Proposed Project or alternatives.

The federal government considers a minority population to be present if the minority population percentage of the affected area is greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (census tracts are generally considered appropriate).

The meaning of *"Disproportionately High and Adverse Effect on Minority and Low-Income Populations"* is that an adverse effect is predominantly borne by a minority population and/or a low-income population, and that the effect will be suffered by the minority population and/or low-income population at an appreciably more severe or greater magnitude than the adverse effect that will be suffered by the rest of the population.

For the Proponent's Proposed Project and alternatives, an analysis is provided to determine whether any of the adverse effects associated with the federal actions would disproportionately affect low-income or minority populations.

4.14.1 ENVIRONMENTAL SETTING

Racial and income data from the 2000 U.S. Census (2005) and income guidelines from HUD and the federal designation of the “poverty level” provides the basis to determine low-income and racial minority populations. The location of minority and low-income populations potentially affected by the Proponent’s Proposed Project was identified through review of census data for the Project Area including lands surrounding the project site. Census Tract 110 covers the area, which includes the communities of the Sleepy Hollow subdivision and Carmel Valley Village, and the geographic region containing San Clemente Creek and River, Tularcitos Creek, and major Project Area access roads, including Cachagua Road. Census Tract 110 represents the environmental justice study area (EJSA). This census tract provides the best available demographic information for the project site and the surrounding area.

Affected Environment-Low-Income Population

The 2000 Census (2005) reports median household incomes for Monterey County of $48,305. Median household income for the census tract (Census Tract 110) in the EJSA is $70,313; with about 64 percent of the households (1,673) in the census tract having incomes exceeding $50,000 and approximately 46 percent of households (1,194) with average earnings of over $75,000 (Table 4.14-3).

Table 4.14-3: Household Income in Census Tract 110 (2000 Census [2005])

Income in 1999	Number	Percent
Less than $10,000	142	5.4
$10,000 to $14,999	54	2.1
$15,000 to $24,999	218	8.4
$25,000 to $34,999	224	8.6
$35,000 to $49,999	297	11.4
$50,000 to $74,999	479	18.4
$75,000 to $99,000	320	12.3
$100,000 to $149,000	424	16.3
$150,000 to $199,999	159	6.1
$200,000 or more	291	11.2
Households	2,608	100.0
Median Household Income (dollars)	70,313	

Source: U.S Census Bureau, Census 2000 (2005)

Approximately 638 or 24.5 percent of the households in the EJSA have incomes at 50 percent or below the median income. Less than 16 percent of the households (414 households) have incomes less than 30 percent of the area’s median income.

Affected Environment — Minority Population

Table 4.14-4 provides a summary of the EJSA racial composition. Racial minorities are 8 to 12 percent (variability due to mixed races) of the total population within the study area. The minority population is predominately Hispanic or Latino (6.9 percent), with the major portion being Mexican (5.2 percent).

Table 4.14-4: Population Racial Composition in the Environmental Justice Study Area (EJSA)

Total Population (One Race)	White	Black or African American	American Indian	Asian	Other	Hispanic or Latino (of any race)
6,149	5,805	21	43	112	163	432
Census Tract Composition	92.4%	0.3 %	0.7 %	1.8%	2.6%	6.9%

Source: U.S Census Bureau, Census 2000 (2005)

2030 Baseline Conditions

No changes to the demography or distribution of race or economic status in the area in the area of Monterey County encompassing the project site that would trigger an Environmental Justice issue, with or without the project.

4.14.2 ENVIRONMENTAL RESOURCE IMPACT STANDARDS AND METHODS

Standards of Significance

No formal, commonly accepted significance criteria have been adopted for Environmental Justice impacts. However, the Presidential Memorandum accompanying the EO directs federal agencies to include measures to mitigate disproportionately high and adverse environmental effects of proposed federal actions on minority and low-income populations. The federal government has developed no specific significance thresholds; however, the following considerations provide the basis of the discussion of potential Environmental Justice impacts.

For purposes of the Environmental Justice analysis, the potentially affected area for this project is the EJSA, Census Tract 110. If a minority and/or low-income population is identified in the affected area and if the technical analysis in the EIS finds that a project would result in significant adverse environmental impacts that cannot be mitigated to a less than significant level, the Environmental Justice analysis must determine whether these impacts would have a disproportionately adverse effect on the minority and/or low-income population. An action that creates disproportionately high and adverse human health and environmental effects on minority or low-income populations would be significant.

Impact Assessment Methodology

The assessment of Environmental Justice issues began with a screening analysis (a federal requirement of NEPA analyses). The purpose of screening is to determine if there exists a minority and/or low-income population within the potential affected area of the Proponent's Proposed Project and alternatives. Minority and/or low-income populations, as defined by EPA's *"Final Guidance for Incorporating Environmental*

Justice Concerns in EPA's NEPA Compliance Analyses (1998)", are identified where either:

- The minority and/or low-income population of the affected area is greater than 50 percent of the affected area's general population; or

- The minority population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (census tracts are generally appropriate for this analysis).

Countywide statistics were reviewed to determine the percentage of the population classified as non-Caucasian and the percentage classified as Hispanic or Latino, and other representative minority groups. Using the county average for comparison, the Project Area census tract data was evaluated to determine whether the minority population percentages were greater than the county average. If the census tract percentage exceeded the county average, the Project Area could then be evaluated for environmental justice effects based on its minority population.

The second criterion for environmental justice analysis is income. As in the case of minority populations, county-wide data was evaluated to determine the percentage of low-income households and then to compare it to the percentage of low-income households in the project study area (EJSA) census tract. If the census tract percentage exceeded the county average, the Project Area could then be evaluated for environmental justice effects based on income levels.

The comparison analysis of Census Tract 110 data on minority populations and low-income populations to that of the county-wide data determined whether or not the Proponent's Proposed Project and alternatives disproportionately affected low-income and minority populations.

4.14.3 IMPACTS AND MITIGATION

The following impact issue has been defined for Environmental Justice:

- EJ-1: Minority and Low Impact Populations

Proponent's Proposed Project (Dam Thickening)

Issue EJ-1: Minority and Low-Income Populations

Disproportionate effects on minority and low-income populations
Determination: ***less than significant, no mitigation required***

IMPACT

As presented earlier in this EIR/EIS Section, according to the 2000 Census (2005), 92 percent of the EJSA was white. At 7 percent, Hispanics and Latinos constitute the largest minority in the EJSA. The minority population in Monterey County is also predominately Hispanic or Latino (47 percent). The total minority population (Black or African American, American Indian, Asian, or other) is 8 to 12 percent in the EJ SA.

The minority population percentage of the EJSA is less than the minority population percentage in the general population (Monterey County). The percentage of minority population in the EJSA is well below 50 percent of the countywide geographical area.

According to the 2000 Census (2005), 2.9 percent (51 families) out of 1,769 families in the EJSA were below the income poverty level. Countywide, 13.5 percent of the families were below the poverty level. In California, 14.2 percent of families were below the poverty line.

The low-income population percentage of the EJSA is less than the low-income population percentage in the general population (Monterey County) and in California. The percentage of low-income population in the EJSA would remain below 50 percent of the county's and state's low-income population.

Based on this screening analysis, it is concluded that the minority and low-income populations of the EJSA fall below the EPA thresholds for an "environmental justice" population and that the Proponent's Proposed Project and alternatives would not disproportionately affect any minority or low-income populations. These include Hispanic, Latino, African American, Asian American and/or Native American groups. The Proponent's Proposed Project and alternatives, therefore, do not raise environmental justice issues and, based on EPA's NEPA "Guidelines an Environmental Justice" analysis is not required to demonstrate that the Proponent's Proposed Project would disproportionately adversely affect minority or low-income populations. The Proponent's Proposed Project would occur in communities with low-, middle-, and high-income residents that are composed of minorities and non-minorities; no disproportionate impacts to minority or low-income populations would result from the Proponent's Proposed Project.

MITIGATION

The Proponent's Proposed Project would not have a disproportionate effect on any minority and low-income populations. No mitigation would be required.

Alternative 1 (Dam Notching)

Issue EJ-1: Minority and Low-Income Populations

Disproportionate effects on minority and low-income populations
Determination: ***less than significant, no mitigation required***

IMPACT

Environmental justice impact issue EJ-1 for Alternative 1 would be similar to that described above for the Proponent's Proposed Project. As with the Proponent's Proposed Project, Alternative 1 would not result in disproportionately high or adverse impacts to minority or low-income populations.

MITIGATION

Alternative 1 would not have a disproportionate effect on any minority and low-income populations. No mitigation would be required.

Alternative 2 (Dam Removal)

Issue EJ-1: Minority and Low-Income Populations

Disproportionate effects on minority and low-income populations
Determination: ***less than significant, no mitigation required***

IMPACT

Environmental Justice impact issue EJ-1 for Alternative 2 would be similar to that described above for the Proponent's Proposed Project. As with the Proponent's Proposed Project, Alternative 2 would not result in disproportionately high or adverse impacts to minority or low-income populations.

MITIGATION

Alternative 2 would not have a disproportionate effect on any minority and low-income populations. No mitigation would be required.

Alternative 3 (Carmel River Reroute and Dam Removal)

Issue EJ-1: Minority and Low-Income Populations

Disproportionate effects on minority and low-income populations
Determination: ***less than significant, no mitigation required***

IMPACT

Environmental Justice impact issue EJ-1 for Alternative 3 would be similar to that described above for the Proponent's Proposed Project. As with the Proponent's Proposed Project, Alternative 3 would not result in disproportionately high or adverse impacts to minority or low-income populations.

MITIGATION

Alternative 3 would not have a disproportionate effect on any minority and low-income populations. No mitigation would be required.

Alternative 4 (No Project)

Issue EJ-1: Minority and Low-Income Populations

Disproportionate effects on minority and low-income populations
Determination: ***less than significant, no mitigation required***

IMPACT

Under Alternative 4, low-, middle-, and high-income households that are composed of minorities and non-minorities would all be affected by potential dam failure or flooding upset. The potential risk of upset would not disproportionately affect any specific income level, or ethnic, or racial groups.

MITIGATION

Alternative 4 would not have a disproportionate effect on any minority and low-income populations. No mitigation would be required.

4.15 OTHER ENVIRONMENTAL EFFECTS

Several environmental resource areas and issues were considered for evaluation and dismissed as not presenting the potential for significant effects. These included socio-economic effects (employment, population, and housing) and effects on public utilities. Each of these is discussed briefly below.

EMPLOYMENT

Construction for the Proponent's Proposed Project and alternatives is expected to occur during two phases. The Proponent's Proposed Project and alternatives would employ a range of 15 to 80 employees during the two phases of construction. The average number of employees would be approximately 45, but the number would vary during each construction year, depending on the tasks. The maximum number of workers (80) would be required for less than one year. According to the US Census, employment in Monterey County in 2000 for populations 16 and older was 299,915, with 184,789 (62 percent) in the labor force. Unemployment totaled 15,658 (5.2 percent) in 2000.

CAW anticipates hiring from within the County or in surrounding counties (driving distance to the project site). There is a sufficient supply of workers in the County. The Proponent's Proposed Project and alternatives would not create a need for additional workers; therefore, no impacts are anticipated to employment.

HOUSING

According to the US Census Bureau, the total number of housing units in Monterey County in 2000 was 131,708, with a vacancy rate of 8 percent (10,472 units). The homeowner vacancy rate was 1.4 percent and the rental vacancy rate was 2.9 percent.

The Proponent's Proposed Project and alternatives would not displace existing or proposed housing. There would be an adequate supply of housing/lodging for construction crews in Monterey County, as most of the workers would be hired locally and would not need housing. No impacts are anticipated to housing.

POPULATION

According to the US Census Bureau, the total population for Monterey County in 2000 was 401,762. The maximum number of workers anticipated for the Proponent's Proposed Project and alternatives is 80, for a limited time period, which represents less than a 0.01 percent change to the County's population. This percent change would only occur if all workers came from outside the area, which is not likely. CAW intends to hire workers locally, from Monterey County and/or surrounding counties.

There would be no direct or indirect increases in population as a result of project, nor would the project induce substantial growth in the area. The project would not cumulatively exceed official regional or local population projections. Therefore, no impacts are anticipated to population.

PUBLIC UTILITIES

There are no known public utilities in the Project Area (Monterey County Public Works Department, pers. comm. 8/9/07). For any construction activity occurring in the Monterey County right-of-way, such as during road improvements on San Clemente Drive, Cachagua Road, or Carmel Valley Road, buried cables would be identified through the Monterey County Public Works permitting process. It is not anticipated that public utilities would be impacted by the Proponent's Proposed Project or any of the alternatives.

CHAPTER 5.0

CEQA & NEPA CONSIDERATIONS

5.0 CEQA & NEPA CONSIDERATIONS

Both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) require analysis of significant irreversible changes. These include significant and unavoidable adverse impacts; cumulative impacts; irreversible and irretrievable commitment of resources; relationships between short-term uses and long-term productivity; and growth-inducing impacts. NEPA also requires analysis of natural or depletable resources. These are described in the following sections.

5.1 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Unavoidable significant adverse impacts are those effects that would significantly affect either natural systems or other community resources, and cannot be mitigated to less than significant. Nearly all the potentially significant impacts associated with the San Clemente Dam Seismic Safety Project action alternatives identified in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) could be reduced to less than significant levels by mitigation measures specified in this EIR/EIS. Almost all of the potentially significant unavoidable impacts are short-term and associated with construction. Significant, unavoidable impacts are summarized below by environmental resource area.

5.1.1 GEOLOGY & SOILS

Under the No Project Alternative, there is a significant risk that seismic activity could lead to the failure of San Clemente Dam (SCD) leading to further impacts discussed below.

Under the No Project Alternative, the left dam abutment could erode due to overtopping of the Dam under a Probable Maximum Flood (PMF), leading to dam failure.

5.1.2 HYDROLOGY & WATER RESOURCES

The Proponent’s Proposed Project and Alternative 1 would have no impacts in this resource area that could not be reduced to less than significant with mitigation using the Sediment Operations and Management Plan (SOMP, Appendix J).

Alternatives 2 and 3 would cause significant and unavoidable short-term changes in riverine sediment transport, deposition, and composition in the Carmel River downstream of SCD resulting from construction. Both alternatives would entail significant and unavoidable increases in the frequency of high suspended sediment concentrations in the Carmel River downstream of SCD.

Alternative 2 would increase sediment deposition to the Carmel River after the Dam is removed due to the inability of excavation to retrieve all sediment deposits and due to the restoration of sediment transport past the dam site. These effects would also have a significant effect on sediment deposition and channel geometry in some reaches of the lower Carmel River and could cause changes in the bed elevation that could significantly change the 100-year flood elevation.

Under the No Project Alternative, there is a significant risk a PMF could cause the failure of SCD, leading to or increasing downstream flooding.

5.1.3 WATER QUALITY

Under the Proponent's Proposed Project and Alternative 1, operation of sluice gates in the Dam to manage sediment accumulation behind the Dam for fish passage would cause suspended sediment increases in the reservoir and in the Carmel River downstream of, resulting in elevated turbidity levels. Operation of sluice gates would likely occur once or twice a year over the life of the Dam. During sluicing, up to 2.4 AF of sediment could be discharged downstream of the Dam over a two-hour time period.

Since this would occur on the rising limb of the hydrograph when flows are expected to continue increasing, and the river would already be sustaining a higher level of turbidity, a large proportion of the sediment would be carried downstream as suspended sediment. This may cause increased turbidity levels that would likely extend more than one mile downstream. The duration of elevated turbidity would depend on the actual length of time that sluicing was conducted as well as the actual flows that occurred. It is estimated that elevated turbidity would last from 12 to 36 hours, perhaps longer. Even though the releases would be intermittent, temporarily discharging small amounts of sediment, water quality degradation could not be mitigated to a less than significant level in the reservoir and would therefore, be a short-term, significant and unavoidable impact.

Under the Proponent's Proposed Project and all alternatives, lowering of water levels of the reservoir (for construction) would increase the turbidity levels and decrease dissolved oxygen (DO) levels. In addition to fine suspended solids, the release of stream channel porewater from the Carmel River and San Clemente Creek into the reservoir would cause iron oxidation to occur, further increasing turbidity and decreasing DO levels. During and following drawdown, movement of sediments previously deposited near the mouths of the Carmel River and San Clemente Creek could slump and shift into the reservoir. This sediment movement could cause further release of anaerobic porewater, resulting in lowered DO. Alternatives 1, 2, and 3 would also increase turbidity during the excavation of sediment in the reservoir. Because water quality degradation could not be mitigated to a less than significant level in the reservoir, these would be short-term, significant and unavoidable impacts.

5.1.4 AQUATIC BIOLOGY

Under the Proponent's Proposed Project and all action alternatives, significant, unavoidable impacts to steelhead and/or their habitat would occur for the same three impact issues. The actions causing significant and unavoidable impacts include: 1) dewatering of channels for construction, or dam removal activities, 2) diversion of the

Carmel River and San Clemente Creek around San Clemente reservoir and dam site, and 3) reservoir dewatering to prepare site for construction or deconstruction activities.

Under the Proponent's Proposed Project, short-term loss of aquatic habitat during construction would be the primary cause of significant and unavoidable impacts to steelhead. Aquatic habitat in a short section of Tularitos Creek and in the Carmel River from the plunge pool downstream for about 400 feet downstream of the Dam would be unavoidably lost due to dewatering during construction. The diversions of the Carmel River and San Clemente Creek would affect rearing habitat upstream of the reservoir for about 1,200 feet in the Carmel River and would affect rearing habitat for juvenile steelhead for the duration of the construction season in the Carmel River. In addition, the drawdown of the reservoir would cause a temporary loss of steelhead rearing habitat in the reservoir for the duration of the construction season. Habitat supporting juvenile steelhead would be lost as a result of these actions. Steelhead would be rescued and relocated to other habitats resulting in handling stress and some potential mortality. Long-term impacts from these activities are less than significant. Even with short-term, significant, and unavoidable impacts, an upgraded fish ladder and implementation of sediment management activities under the Proponent's Proposed Project would improve the long-term environment for steelhead over current conditions.

Under Alternative 1, impacts would occur to rearing habitat in the Carmel River from dewatering and would be the same as the Proponent's Proposed Project. Impacts to the Carmel River due to construction diversion would be much greater, extending upstream for about 5,000 feet on the Carmel River and 1,350 feet on San Clemente Creek and would occur for three seasons instead of only one, thus affecting many more steelhead in the Carmel River and San Clemente Creek than the Proponent's Proposed Project. The seasonal loss of rearing habitat in the reservoir due to drawdown would be greater, since it would occur for three consecutive years during the construction season. In addition, impacts from sediment removal in the reservoir would cause significant and unavoidable impacts to upstream riverine resources. Approximately 4,700 feet of the Carmel River and about 1,350 feet of San Clemente Creek would become unavailable as rearing habitat for the two years it would take to remove deposited sediment from behind the Dam. All of the existing habitat along the channels would be eliminated during CY 3 as deposited sediment is removed from the inundation area. Full recovery to functional channels may take from three to seven years after restoration is completed. Long-term impacts from these activities are less than significant. Even with short-term, significant, and unavoidable impacts, an upgraded fish ladder and implementation of sediment management activities under Alternative 1 would improve the long-term environment for steelhead over current conditions.

Under Alternative 2, significant, unavoidable impacts would be similar to Alternative 1, but would occur for three construction seasons upstream of SCD. Diversions and loss of flow would cause the loss of seasonal rearing habitat along the same lengths of channel in Carmel River upstream and downstream of SCD, and in San Clemente Creek upstream of the Dam. Similar losses of rearing habitat in the reservoir due to dewatering would also occur, but would extend over three construction years. Channels would be completely removed during sediment excavation then reconstructed along their former alignments. In addition, impacts of sediment released from the former reservoir would have significant and unavoidable impacts to downstream reaches of the Carmel River in the short-term, but would produce beneficial impacts to fish passage and aquatic habitat conditions in the long-term.

Under Alternative 3, impacts would be much less than those described for Alternative 2 for dewatering of channels for construction, or dam removal activities. Impacts from the diversion of the Carmel River and San Clemente Creek around San Clemente reservoir would result the loss of 3,200 feet of the Carmel River upstream of the Dam and about 1,350 feet for San Clemente. Impacts from reservoir dewatering to prepare the site for sediment removal and channel reconstruction would be similar to the Proponent's Proposed Project. Impacts to upstream resources in the Carmel River would be limited to river crossings of the upstream access road, but the existing riverine and riparian habitat in the Carmel River upstream of about 3,200 feet from SCD would remain in tact. In addition, impacts from sediment removal would have significant and unavoidable impacts in the short-term, but beneficial impacts to fish passage and aquatic habitat conditions for the long-term.

Under Alternative 4, no construction would occur; therefore, there would be no construction related effects. Annual drawdowns would continue to result in some loss of fish and habitat; this condition would self-correct reservoir water levels are restored and the fish ladder becomes inoperable. Impacts to fish migrating both upstream and downstream would be significant and unavoidable.

5.1.5 VEGETATION AND WILDLIFE

Under the Proponent's Proposed Project and all alternatives except Alternative 4 (No Project), injury or loss of California red-legged frogs (CRLF) and western pond turtles may occur during rescue operations associated with construction activities, including the reservoir dewatering. Injury or loss of CRLF may occur due to handling of frogs during relocation, and because some relocated frogs and tadpoles may fail to adjust to the new environment at the ponds used for relocation. Provisions for potential injury or loss will be part of the United States Fish and Wildlife Service (USFWS) Biological Opinions (BOs) for the project and its alternatives.

In addition to potential injury or loss of CRLF and western pond turtles, under Alternatives 1, 2, and 3, removal of sediment from San Clemente Reservoir would also include some injury or loss of Coast Range newt larvae, and western pond turtle juveniles and hatchlings from the sediment bed before commencing vegetation removal or sediment excavation, or if individuals are missed in the rescue operation.

Under Alternative 3 brushland and riparian habitat clearing and channel excavation would remove some habitat for aquatic species including the CRLF, Coast Range newt and the western pond turtle. These activities may also affect other special-status terrestrial wildlife species, particularly the Monterey dusky-footed wood rat. Impacts on terrestrial species would be assessed by preconstruction survey and flagging of special-status species habitat for avoidance during construction.

While it is difficult to determine whether the loss of CRLFs and other species that are not rescued or that are injured or die during rescue and relocation operations is significant, these losses along with the temporary loss of habitat for the CRLF cannot be fully mitigated and would be significant in the short-term. However, the CRLF Program, which is part of the mitigation provided, would restore additional sites as mitigation habitat for CRLFs and other species. This mitigation would improve habitat and provide a long-term beneficial impact.

5.1.6 AIR QUALITY

Under the Proponent's Proposed Project and all action alternatives, there would be an increase in NO_X emissions. Although small, there may be an incremental significant, unavoidable impact on ambient air quality in distant residential areas or at the Dam site from NO_X emissions because these emissions are above the mass emissions significance threshold. The nearest residential receptors are located far enough from the Dam site (3,900 to 5,300 meters) that only a limited amount of dispersed NO_X would be transported by wind due to diffusion.

Under the Proponent's Proposed Project and all action alternatives, estimated emissions of fugitive dust (PM_{10F}) could potentially exceed the PM_{10} threshold of 82 lb/day by an amount that would be significant; thus requiring mitigation in order to minimize ambient air impacts. This would primarily be due to travel on unpaved roads between the filter plant and dam.

There are several feasible mitigation measures that address the many sources of PM_{10} during the construction phase of a project (e.g., grading, wind erosion, entrained dust). Common measures include watering, chemical stabilization, or reducing surface wind speeds with windbreaks. Other measures include practical and cost-effective NO_X controls for diesel vehicles and equipment, such as Viscon, and use, where possible, of state-certified construction equipment.

The air quality impacts are minor and short-term. However, even with implementation of feasible mitigation measures, NO_X and PM_{10F} emissions would not be reduced below the mass emissions significance threshold and would be significant and unavoidable.

5.1.7 NOISE

Under the Proponent's Proposed Project and all action alternatives, significant, unavoidable impacts on noise would occur as a result of project construction activities including truck traffic and operation of the batch plant. Although these effects would be localized in the Project Area, the resultant noise levels, at some times, at some locations may be above the normally acceptable range and/or more than 5 dBA above background. Even though these instances would be transient and temporary, they would be significant and unavoidable.

5.1.8 TRAFFIC AND CIRCULATION

Under the Proponent's Proposed Project and all action alternatives, significant unavoidable impacts on quality of life and traffic safety for residences along San Clemente Drive would occur due to the increased truck traffic. For the Proponent's Proposed Project, mobilization and demobilization of construction equipment using San Clemente Drive is expected to occur over a period of several weeks and involve 15 to 30 trips with heavy equipment. Thereafter, five to 10 trips per day on San Clemente Drive would be used for worker, supervisor, and maintenance access over a period of up to eight months of CY 3 during the construction of the Tularcitos Access Road. For Alternatives 1, 2, and, 3, San Clemente Drive would be needed to provide access below the Dam, which is not accessible from the Chachagua route. San Clemente Drive would be used for initial mobilization of equipment for several weeks at the beginning of each construction year, an occasional truck and workers during the project, and demobilization at the end of each construction year for a period of several weeks. The amount of trips during that several week period is expected to be 15 to 30 trips with heavy equipment. It is anticipated that less than 25 percent of the total construction traffic would use San Clemente Drive for access below the Dam for Alternatives 1, 2, and 3. In addition for those alternatives, the number of trips added to San Clemente Drive is not projected to exceed 12 trips per day. Although the additional trips do not change the level of service or street capacity of San Clement Drive, they may affect the quality of life for the residents who are not used to any outside traffic.

A number of mitigation measures have been proposed which range from building new access roads, limiting traffic based on time of day and type of load, and providing notification to residents. Although the changes to the existing traffic on San Clemente Drive would be short-term, even with mitigation measures, out of an abundance of caution, they would be significant and unavoidable in large part because they affect the quality of life for the residents.

Alternatives 1 and 2, and 3 require the use of the Jeep Trail to transport sediment to the 4R sediment disposal site. During the construction of the Jeep Trail improvements, non-project related traffic traveling on the Jeep Trail would be subjected to delays. The volume of traffic currently using the Jeep Trail is low. However, the Jeep Trail provides access to non-project related parcels in the area and construction activity on the trail would impact access to those parcels. Increased traffic and construction related delays would occur during CY 4, primarily from June through October. At this time, it is not possible to precisely estimate the delay that non-project traffic would incur on the Jeep Trail during construction of improvements to the Jeep Trail. The amount of delay that a motorist on the Jeep Trail would experience during the road construction period would depend on the construction activity underway at the time the motorist arrives at the section under construction, and the amount of time required by the construction crew to create a passable surface for the motorist. If the other users of the Jeep Trail can provide the construction contractor with a schedule for their use of the Jeep Trail, delays might be reduced to less than significant. Because the amount of time that would be required to create a passable road surface cannot be known in advance, and the schedules of other users are not known, out of an abundance of caution, the impact of the project during the one-year period of construction of improvements to the Jeep Trail would be significant and unavoidable.

5.1.9 CULTURAL RESOURCES

Significant and unavoidable impacts include the permanent alteration of the OCRD and associated Fish Ladder); thickening, notching, or demolition of SCD; replacement of the SCD Fish Ladder; and altering the character of the setting of significant historic resources and the visual character of SCD Historic District.

5.1.10 AESTHETIC RESOURCE

Comments from homeowners in the Sleepy Hollow Subdivision stated that two homes would have their view obstructed by the concrete batch plant. Field reconnaissance results, based on visibility from the street level, were that the batch plant would not be visible. Whether visible or not, the batch plant would be a temporary structure that would be removed within one year of its construction. The distance of the batch plant from the Sleepy Hollow Subdivision is approximately 2,500 feet. This distance, coupled with obstructions from vegetation, would lessen the batch plant visual impacts to Sleepy Hollow. Any visual impacts would be short-term and construction-related; no long-term visual effects would occur to Sleepy Hollow homeowners as a result of construction and operation of the concrete batch plant. Although the batch plant would be some distance from the two residences and the impact would be short-term, it is difficult to say with certainty that the impacts would be less than significant and they are therefore would be short-term significant and unavoidable.

During construction under Alternatives 1 and 2, private landowners of the Stone Cabin would have views of the sediment disposal site adjacent to the Jeep Trail and the sediment conveyor overcrossing, which would be above the Jeep Trail. A relatively small segment of the sediment disposal site would be visible to the landowners traveling on the Jeep Trail for a short duration of travel time. The sediment conveyor overcrossing together with the sediment pile would degrade the existing visual character or quality of the site and its surroundings during construction. Mitigation measures for short-term impacts would include screening the portion of the sediment disposal site adjacent to the Jeep Trail with vegetation during construction. Mitigation measures for long-term visual impacts would include revegetation of the sediment disposal site and the removal of the sediment conveyor overcrossing. Even with mitigation measures, it is difficult to say with certainty that the impacts would be less than significant; and would be short-term, significant, and unavoidable.

5.1.11 LAND USE

The alternatives that require the use of Site 4R (Alternatives 1 and 2) would use existing park land for sediment disposal. Although designated as open space use, the area is currently inaccessible for public use (except for authorized users of Stone Cabin). Out of an abundance of caution, this impact would be short-term, significant, and unavoidable. Revegetation activities would reduce this impact to less than significant in the long-term.

5.1.12 RECREATION

Travel by recreational users on the Jeep Trail would be disrupted for the period of construction for Alternatives 1, 2, and 3. The area is currently inaccessible except authorized users of Stone Cabin. Although there are no current plans for the area, Park District owned land which has been proposed as a sediment disposal site (Site 4R) would also be disrupted during the period of construction for Alternatives 1 and 2. Although resulting in relatively minor disruptions, these impacts occur in an area that is rural in nature and with few outside disruptions. Out of an abundance of caution, these impacts would be significant and unavoidable, short-term impacts. Revegetation activities, along with l leaving use of the improved road to the discretion of the MPRPD would reduce these impacts to less than significant in the long-term.

5.2 GROWTH INDUCEMENT

CEQA requires that any growth-inducing aspect of a project be discussed in an EIR. This discussion should include consideration of ways in which the project could directly or indirectly foster economic or population growth, or the construction of additional housing, in adjacent and/or surrounding areas. Projects which could remove obstacles to population growth (such as major public service expansion) must also be considered in this discussion. According to CEQA, it must not be assumed that growth in any area is necessarily beneficial, detrimental or of little significance to the environment.

The Proponent's Proposed Project is a seismic retrofit of an existing dam structure, required by the Division of Safety of Dams (DSOD). The existing dam and reservoir are currently used in conjunction with the Los Padres Dam and Carmel Valley aquifer wells as a source of water diversions to the Carmel Valley Filter Plant (CVFP). The reservoir also serves as the primary source of water for the unincorporated Carmel Valley Village. The water storage capacity of San Clemente Reservoir has diminished from approximately 1400 AF (with gates down) at the time of construction (1921) to its current level of approximately 100 AF due to siltation.

None of proposed San Clemente Dam Seismic Safety Project alternatives would increase the capacity of the existing reservoir, or increase water supply. They would not change how the operational water releases occur for fish passage under the annual Memorandum of Agreement (MOA) among the California American Water Company (CAW), the California Department of Fish and Game (CDFG), and the Monterey Peninsula Water Management District (MPWMD). No water would be available for additional growth, and no other potential growth-inducing effects have been identified.

The project would largely employ a local construction workforce and would not increase local housing demand or population. The project is not considered growth-inducing.

5.3 CUMULATIVE IMPACTS

5.3.1 INTRODUCTION

Cumulative impacts may result from individually minor but collectively significant effects of several projects over a period of time. Cumulative effects may occur when the incremental impacts of a Proponent's Proposed Project, added to those of other closely related past, present, and reasonably foreseeable probable future projects, become environmentally important.

Under CEQA, "cumulative impacts" refers to two or more environmental effects that, when combined, are "considerable" or which compound or increase other environmental impacts. NEPA defines "cumulative impact" as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. NEPA and CEQA guidelines require a discussion of cumulative impacts when they are significant. The discussion should reflect the severity of the impacts and their likelihood of occurrence, and should be guided by the standards of practicability and reasonableness.

CEQA requires either (1) a list of past, present, and reasonably foreseeable future projects producing related or cumulative impacts, including those projects outside the control of the lead agency ("list approach"); or (2) a summary of projects contained in an adopted general plan or related planning document that is designed to evaluate regional or area-wide conditions ("plan approach").

CEQA also requires a summary of the expected environmental effects to be produced by those projects, with specific reference to additional information stating where that information is available; and a reasonable analysis of the cumulative impacts of the relevant projects. An EIR must examine reasonable options for mitigating or avoiding any significant cumulative effects of a Proponent's Proposed Project. In some situations, the only feasible mitigation for cumulative impacts may involve the adoption of ordinances or regulations, rather than the imposition of conditions on a project-by-project basis.

5.3.2 APPROACH

Cumulative impact analysis requires selection of Reasonably Foreseeable Future Actions (RFFA). These are projects that are expected to occur within the same physiographic region and time frame as the Proponent's Proposed Project, but are not yet in existence. While there is not an obligation to consider highly speculative projects (e.g., a project that is in its most preliminary stages of formulation), this EIR/EIS is not limited to projects that have received regulatory approval and are awaiting construction. The following classes of RFFAs were defined:

- Projects of Regional Significance. These are projects large enough to have a detectable influence at the Carmel River watershed or CAW service area scale (geographic criteria), or which impact a specific resource of regional importance which would also be affected by the action alternatives. This category includes completed projects that are just beginning to operate, projects in construction, projects that have been permitted but have not yet begun construction, projects that are in the permitting process and projects that are in the initial development process (temporal criteria). Projects that have been recently completed are included in the No Project Alternative (base case).

- Regional Programs. In addition to projects there may be development or regulatory programs that are regional in scope. An example would be management plans developed by Monterey County that would result in changes to land use and development.

Not included in the RFFA category are ongoing trends in the use or degradation of regional resources (such as ongoing siltation behind Los Padres Dam (LPD), or increased water consumption, wastewater effluent, or other derivative effects of land development from urbanization), or regulatory programs that are already underway to manage regional environmental resources (such as air and water quality improvement programs). These trends are included in the No Project Alternative or base case and are discussed in each resources section in Chapter 4 under the 2030 baseline section.

A list of RFFAs to be analyzed was compiled using the following steps:

- An initial list of possible RFFAs was compiled and expanded in discussion with the Lead and Cooperating Agencies. Information was sought on specific projects or programs that should be considered. A summary of environmental documents or permits issued in the region for the past 5 years was obtained from Monterey County. Possible RFFAs were discussed with CAW, MPWMD, and others involved in the Carmel River watershed, including the Lead and Cooperating Agencies.

- To be included, an RFFA needed to be under active consideration; have recently completed or be at some active stage of environmental documentation; be completed or operational within the timeframe being considered for the PPP and its alternatives (2030 for operational consideration and three to four years for construction). Projects were excluded that have made no progress to initiate the permitting process with the past two years, or if started, have not completed permitting within the past two years, if it appears that the project is not moving forward.

- The candidate RFFAs were briefly reviewed to determine their regional significance and pertinence for the cumulative impact analysis to determine whether the RFFA, in combination with the Proponent’s Proposed Project and other action alternatives (collectively, the “action alternatives” or “project alternatives”), has the potential to affect the same resources.

- Any existing impacts analysis was obtained for the selected projects, and a brief project description was prepared for resource specialists to use as the basis for the cumulative impact assessment.

5.3.3 PROJECTS CONSIDERED FOR CUMULATIVE ANALYSIS

The following projects, plans and programs were considered for inclusion as RFFAs:

- Monterey County Development Projects
- Monterey Peninsula Regional Park District development in the Carmel River watershed
- MPWMD Carmel River Management Program
- Monterey Peninsula, Carmel Bay, and South Monterey Bay Integrated Regional Water Management Plan and Integrated Coastal Watershed Management Plan
- Regional Water Supply Projects
- Carmel River Watershed Assessment and Action Plan
- Carmel River Lagoon (Sand Bar) Management Plan
- Growth within the Region

It is important to note the construction periods for cumulative projects. Presently, construction of the Proponent's Proposed Project or its alternatives would last for two to three construction seasons. If permitting is complete, preparatory work such as road improvements could start, at the earliest, in 2009. If construction schedules do not overlap, temporary construction impacts such as those relating to traffic or sediment would not be cumulative with other projects.

Monterey County General Plan

The Project Area is under the jurisdiction of the Monterey County General Plan (GP 2006), which was adopted in January of 2007. Potential impacts to land use, population, housing, and utilities were evaluated in Chapter 4, considering a baseline environment projected through the year 2030. Analysis indicated that no project-related impacts to these areas are anticipated in this period. No cumulative impacts are anticipated in regards to the goals, policies, and land use designations contained in the Monterey County General Plan.

Carmel Valley Master Plan

A Draft Subsequent EIR was released in August 2007 for changes to the Carmel Valley Master Plan (CVMP), including designing an update of the circulation and traffic impact fee elements and preparing a program EIR on the new circulation improvements to address traffic concerns. The project alternatives would have traffic and circulation impacts on the area covered by the CVMP during the period of construction and mitigation measures are identified in this EIR/EIS. With implementation of the mitigation measures identified, no potential significant adverse cumulative impacts are anticipated with regard to traffic in the area.

Monterey County Development Projects

To identify possible RFFAs in the Carmel River watershed, a search was conducted of Monterey County permit actions on parcels within five miles of SCD. Monterey County has approved permits for approximately 65 projects in this area since January 2000. Most of these are individual residences. Four projects are large enough to be of potential regional significance. These included:

- Rancho San Carlos Partnership Project. This development consists of the proposed construction of a 30,829 square foot employee operations center to include a mechanical shop, a carpentry building, a golf vehicle garage, a chemical storage building with mixing area, a landscaping building, an emergency vehicle garage, and operations vehicle garage, an operations office, an employee center and other small outbuildings. The property is located at 121 Rancho San Carlos Road, Carmel Valley. A Combined Development Permit was granted in 2002 and the County has recorded no activity on the project since that time. It is excluded from further analysis because it has been inactive for more than two years and does not appear to be a RFFA. This project would occur in an existing developed area. The infrastructure is in, the only things that are being constructed would be the private homes and all of those sites have already been purchased. No potential significant adverse cumulative effects on resources that may be affected by the San Clemente Dam Seismic Safety Project action alternatives are foreseen.

- Carmel Valley Recreation and Parks Museum Facility Project. The project includes construction of a 2,400 square foot museum on the first floor with a 400 square foot storage room on the second floor. The property is located at 77 West Carmel Valley Road, Carmel Valley. This project occurs in an existing developed area. No potential significant adverse cumulative effects on resources that may be affected by the San Clemente Dam Seismic Safety Project action alternatives are foreseen.

- Garland Ranch Regional Park Addition. The park is proposing to add 1,300 acres to the existing Garland Ranch Regional Park, located southerly and northerly of Carmel Valley Road, adjacent to the Garland Ranch Regional Park. This project was completed in 2004 and is included in the baseline for impacts analysis in Chapter 4 of this EIR/EIS. It is therefore excluded from cumulative effects analysis.

- White Oak Plaza Project. This project includes the development of approximately 7,267 square feet of new building area and construction of additional parking; development of 5,667 square feet of buildings for office and light commercial uses; a 1,600 square-foot restaurant; and additional parking spaces. The property is located at 27 East Carmel Valley Road, Carmel Valley, in the Carmel Valley Village Area.

This project occurs in an existing developed area. No potential significant adverse cumulative effects on resources that may be affected by the San Clemente Dam Seismic Safety Project action alternatives are foreseen.

- Rancho Cañada Village. An application has been filed with Monterey County for an approximately 280-unit subdivision that includes a mixed-income neighborhood using traditional design principles (compact, pedestrian-friendly). The proposed subdivision design is intended to address workforce housing needs of Carmel Valley and surrounding areas. The subdivision would include approximately 280 units (with a mix of single-family, town homes, and condos/flats), trails, and open spaces. Affordable and workforce units would comprise 50 percent of the project. This project would displace an existing 18-hole golf course and would use 72 AF of water per year, which represents an annual water savings of 75 to 100 AF as compared to current golf course irrigation use. The project would reduce traffic from the closure of the golf course and a traffic mitigation fee of approximately $2.5 million for Carmel Valley Road improvements would be paid by the project. The project includes enhancement of riparian and steelhead habitat on about one mile of the Carmel River, including a 26-acre habitat preserve. The project would have generally beneficial impacts on resources that would be cumulatively offsetting to any incremental impacts from the San Clemente Dam Seismic Safety Project. Therefore, it would require no additional mitigation for cumulative impacts. No potential significant adverse cumulative effects on resources that may be affected by the San Clemente Dam Seismic Safety Project action alternatives are foreseen.

Monterey Peninsula Regional Park District Development in Carmel River Watershed

The MPRPD-owned land in the Project Area is currently closed to public access pending the development of a management plan. The plan would contain a public access plan of the park-owned land in the Project Area (pers. comm. Tim Jensen 2006). The development of a park management plan is a Reasonably Foreseeable Future Action. Potential visual impacts to future park users are likely to be less than significant or beneficial. The action alternatives would not affect the visual landscape near the lands managed by the MPRPD including the access roads. The roads would be improved as part of Alternatives 1, 2, and 3, but would still be dirt roads. Therefore, there would be no visual impact as a result of the road improvements. Removal of accumulated sediment under Alternatives 1, 2, and 3 would restore part or all of the Carmel River/San Clemente Creek in the reaches that traverse MPRPD lands to a free-flowing stream, which would have a beneficial aesthetic effect. Under the Proponent’s Proposed Project and in other sections of the river, there would be no change. With the removal of accumulated sediment, the long-term visual effects to the riverfront would therefore be either less than significant or positive for future park users.

In addition, for future park users, the design of the diversion dam for the bypass alternative (Alternative 3) is permeable. The intention is to allow seepage that will maintain a high water table in the area downstream of the diversion, so that habitat for riparian species such as the CRLF will persist. Under the Proponent's Proposed Project, wetlands in these areas would not be affected. Under Alternative 1, sediment excavation would remove some wet areas, which should reestablish with time. Under Alternative 2, all wetlands would be removed. The visual effects of changes to wetlands would be less than significant under the Proponent's Proposed Project and Alternative 3; and significant and unavoidable under Alternatives 1 and 2 (but limited to the short-term under Alternative 1).

MPWMD Carmel River Management Program

The MPWMD has historically implemented an annual program of projects in the Carmel River addressing such objectives bank stabilization, and fish enhancement. These actions, going forward, are now incorporated in the Integrated Regional Water Management Plan (IRWMP), discussed below.

Monterey Peninsula, Carmel Bay, and South Monterey Bay Integrated Regional Water Management Plan and Integrated Coastal Watershed Management Plan

The IRWMP was released in draft form in July 2007. It seeks to integrate many previous plans and strategies addressing environmental resources in the region, and to comprehensively address the future management of water resources. These include:

- Habitat conservation and restoration
- Critical Coastal Areas Program (storm water planning)
- Water supply planning
- Groundwater management
- Flood management
- Water conservation
- Recycling and treated wastewater
- Wetlands
- Recreation
- Desalinization
- Conjunctive water use
- Carmel River watershed planning

IRWMP objectives address local and regional water supply planning; management of surface water and groundwater; augmentation of water supply; ecosystem restoration; water quality improvement; recreation/public access opportunities; conflict resolution; and flood control. The plan includes the action items from the 2004 Carmel River Watershed Assessment and Action Plan and the 1984 Carmel River Management Plan.

The IRWMP is intended to improve the Carmel River watershed environment, and actions taken under the plan probably would be beneficial and cumulatively offsetting to any incremental impacts from the San Clemente Dam Seismic Safety Project. Beneficial impacts would require no additional mitigation for cumulative impacts. No potential significant adverse cumulative effects on resources that may be affected by the San Clemente Dam Seismic Safety Project action alternatives are foreseen by implementation of the IRWMP. Potential cumulative impacts for specific projects or types of projects included in the IRWMP are discussed below.

Regional Water Supply Projects

Associated with the draft IRWMP is a matrix of water projects, including the following:

- Coastal Water Project (CAW)
- North Monterey County Desalination Project (Pajaro/Sunny Mesa Community Services District [P/SM])
- Seaside Basin Groundwater Replenishment Project (MRWPCA)
- Phase 1 Aquifer Storage and Recovery (Seaside Basin) (MPWMD)
- Marina Coast Water District Regional Urban Water Augmentation Project (Marina Coast Water District [MCWD]) and Monterey Regional Water Pollution Control Agency [MRWPCA])
- Sand City Desalination Project (MPWMD)
- Sand City Water Supply Project (City of Sand City)

The water supply alternatives considered by the plan are being independently pursued by the various proponents identified above. It is unlikely that all of them would be constructed or needed, although some will be. It is not yet clear which of these regional water projects will move forward. For example, the Proponent's Environmental Assessment (PEA) for the Coastal Water Project states "It is unlikely that both the Proponent's Proposed Project and the MPWMD Sand City project would be constructed, given that they are intended to achieve the same objective of replacing existing supply from the Carmel Valley Aquifer as specified by the State Water Resources Control Board (SWRCB) Order 95-10."

Environmental documentation is in process for some of the projects, and has not begun for others, as follows:

- Coastal Water Project: PEA prepared, California Public Utilities Commission (CPUC) preparing to initiate Draft Environmental Impact Report (DEIR)
- North Monterey County Desalination Project: preparing to initiate DEIR
- Seaside Basin Groundwater Replenishment Project: DEIR anticipated to be initiated in late 2007
- Phase 1 Aquifer Storage and Recovery: EIR certified in August 2006
- Marina Coast Water District Regional Urban Water Augmentation Project: DEIR distributed June 2004
- Sand City Desalination Project: not initiated
- Sand City Water Supply Project: Draft EIR published in October 2000

Cumulative impacts for some of these projects (the desalinization projects) are addressed in the Coastal Water Project PEA. Most of these projects are located out of the area in which effects of the San Clemente Dam Seismic Safety Project would occur for most environmental resources. Potential cumulative effects could include:

- Air Quality Impacts
- Traffic impacts, where construction windows overlap
- Hydrologic impacts on the Carmel River
- Aquatic biology impacts resulting from hydrologic impacts

The San Clemente Dam Seismic Safety Project has no effect on water supply (see Section 4.2), so there is no potential cumulative effect on this resource. The potential that the above projects will be constructed at all, let alone at overlapping times with any of the action alternatives is speculative at best, so cumulative effects from traffic and other short-term construction impacts cannot be adequately defined for analysis although they could add to existing impacts and are discussed below under each resource section. The potential for hydrologic impacts (and indirectly, impacts to aquatic biology) could arise from two sources:

- Direct impacts from the diversion of Carmel River winter flows occur under one of the projects (Seaside Basin project).

- Indirect benefits to Carmel River flows could occur if these projects supply water to CAW service area, resulting in reduced pumping from CAW wells in continuity with the Carmel River.

These potential cumulative effects are analyzed below under each resource section.

Coastal Water Project

The project consists of a seawater-to-potable-water desalination facility located near the community of Moss Landing in the northern part of Monterey County. A product water conveyance pipeline would run approximately 19 miles in a general southerly direction until it connects to the existing CAW water distribution system in the CAW service territory, generally including the cities of Seaside, Sand City, Monterey, Del Rey Oaks, Pacific Grove, and Carmel-by-the-Sea. In addition, the pipeline would have a turnout to aquifer storage and recovery (ASR) facilities, which would be approximately four miles inland, near Seaside. Several water storage tanks, pumps, and other facilities would be located along the pipeline and in the ASR component of the project. The ASR facilities would be located in the general vicinity of an existing ASR facility operated jointly by CAW and MPWMD. A PEA has been completed and submitted to CPUC, which is preparing to complete an EIR under CEQA.

North Monterey County Desalination Project

The North Monterey County Desalination Project (NMCDP), as currently described by the proponents, is a “merchant” water supply project sponsored by the Pajaro/Sunny Mesa Community Services District (P/SM). Major components of the NMCDP proposal are a seawater desalination plant in Moss Landing and a potential 30-acre solar energy power production facility to reduce energy costs. The proposed desalination facility site is the former National Refractories and Minerals plant, with planned use of the existing intake/outfall pipelines.

The yield goal is 20,000–30,000 AFY, depending on demand. A primary goal is to meet current and future needs of the expanding P/SM service area in northern Monterey County (possibly up to 5,000 AFY). The project is proposed to meet the current and future needs of communities from Moss Landing to the Monterey Peninsula. The P/SM Board has authorized creation of a Joint Powers Authority (JPA) with MPWMD, and is exploring partnerships with other public entities. However, no engineering or environmental documents were publicly available for the verification of the proposed facilities and operation of this proposed project. Also, this project was not awarded its Proposition 50 grant funding for Pilot Testing, and it is unknown if P/SM has other sources of funding available to proceed with its project.

Seaside Basin Groundwater Replenishment Project and Phase 1 Aquifer Storage and Recovery

The feasibility of this project continues to be studied by the MPWMD and others. The project would involve diversion of excess flows (as defined by the SWRCB) from the

Carmel River during winter high-flow periods, and the subsequent injection of the water into the Seaside aquifer for later recovery during the dry season. The CAW water distribution system may need to be expanded, depending on the ultimate scope of the project. If the project serves to supplement existing facilities and reduce reliance on summer diversions, then no expansion may be necessary, although improvements such as increasing pipeline size and treatment may be undertaken.

The environmental effects of Phase 1 of the MPWMD ASR Project have been analyzed in an EIR/EA certified by the MPWMD Board in August 2006. The Phase 1 project entails a second injection well at the MPWMD's existing Santa Margarita Test Injection well site on the former Fort Ord, using existing and planned CAW facilities. Subsequent phases would be the subject of separate future environmental review, and would depend on the progress of other regional water supply projects described in this chapter. The DEIR/EA concluded that the well and pipeline portion of the project would have relatively minor construction impacts; operation of the project would have beneficial effects on the Carmel River hydrology and dependent fish and wildlife. CAW distribution system modifications, if needed, would occur primarily in the Seaside area and upland hills. This project could offset any cumulative impacts to the Carmel River environment, depending on its ultimate configuration and operation. No additional mitigation measures for cumulative impacts are likely to be needed as a result of this project, but until the project is more fully developed, this cannot be certain.

Marina Coast Water District Regional Urban Water Augmentation Project Seawater Desalination

Marina Coast Water District (MCWD) has a small seawater desalination plant, located at its former wastewater treatment plant site on Reservation Road between Dunes Drive and the Monterey Bay. The plant, which is not currently in operation, was built in 1997 and utilizes a single-pass, reverse osmosis (RO) system with a production design capacity of 300 AFY. A seawater collection well is located on the beach west of the State Parks Department parking lot. Reject brine is disposed of in an injection well to the shallow dune aquifer. The brine migrates downgradient toward the ocean and is diluted by groundwater, and wave and tidal action.

Under the MCWD Regional Urban Water Augmentation Project, the project was developed by MCWD as a means of meeting the water augmentation requirements identified in the Base Reuse Plan and accompanying EIR for the former Fort Ord. Its principal objective is the production of 2,400 AFY for use in the Ord community.

MPWMD Sand City Desalination Plant

The MPWMD proposed the construction of a desalination plant in Sand City with a production capability of 8,400 AFY. The desalination plant would use the RO process to remove salts from seawater. This process is about 50 percent efficient; therefore, the desalination plant would require 15 million gallons per day (mgd) of feedwater to produce 7.5 mgd of potable water. At the same time, the plant would produce about 7.5 mgd of brine concentrate that would be returned to the ocean.

An administrative draft EIR was prepared by MPWMD and reviewed by its Board in December 2003. At that time, completion of a public DEIR was delayed until additional studies on seawater intake and brine discharge technology could be completed. In March 2004, the MPWMD Board determined that it would not pursue the desalination project, pending review of regional desalination projects in Moss Landing that had been proposed. Currently, MPWMD is not actively pursuing the project.

City of Sand City — Sand City Water Supply Project

This project would supply potable water to customers in Sand City at a rate of up to 300 AFY. The proposed design of the desalination system is similar in concept to a system currently operating in the City of Marina, approximately four miles northeast of the project area. This project would replace the existing CAW supplies (currently 135 AFY) and provide treatment and use of up to an additional 165 AFY.

The Sand City Water Supply Project consists of the construction and operation of an RO desalination facility and improvements to the potable water distribution system to serve existing and future residents and commercial/industrial uses in Sand City. Water would be extracted from the shallow, unconfined brackish water aquifer near Monterey Bay and treated to remove salts. This project also includes the installation of approximately 7,000 linear feet of 8 to 12 inch diameter water mains to improve fire flows in the City once the existing water distribution system is disconnected from the CAW water supply system.

Carmel River Watershed Assessment and Action Plan

With a grant from the SWRCB, the Carmel River Watershed Conservancy (CRWC) conducted a watershed assessment and developed an action plan for the Carmel River Watershed in 2004. The purpose of the assessment was to provide a Carmel River Watershed Management Plan in which specific water quality goals would be defined through the planning process and implementation of management measures to achieve these goals would occur. The assessment describes and documents all of the CRWC's concerns in the watershed and those areas where problems exist. Eight action categories were identified, including flows, groundwater, habitat, sedimentation, steelhead, education, public safety, and water quality. The plan makes specific reference to SCD and its effects on sediment transport, fish habitat and fish migration. The Proponent's Proposed Project and other action alternatives considered in this EIR/EIS are consistent with the objectives of the plan, which expresses a desire to upgrade or remove the Dam.

Implementation of the plan's actions is uncertain. Parts of the plan (e.g., those actions affecting water supply or lagoon management) are being undertaken by MPWMD and are incorporated in the IRWMP described above. According to the MPWMD, the CRWC is implementing the plan through partnerships (Larry Hampson, pers. comm. September 21, 2005). Although an environmental assessment of the plan is not available, the intent of the plan is to improve the Carmel River watershed environment, and actions taken under the plan probably would be beneficial and cumulatively offsetting to any incremental impacts from the San Clemente Dam Seismic Safety Project action alternatives. Beneficial impacts would require no additional mitigation for cumulative impacts. This plan is not addressed further in this EIR/EIS.

Carmel River Lagoon (Sand Bar) Management Plan

This plan, released in April 2007, addresses how and when breaching of the Carmel River Lagoon would be permitted. Breaching currently occurs under emergency permits. California State Parks is the agency leading the development of the plan, and several other agencies are involved, including NMFS, Monterey County, CDFG, MPWMD, homeowners, and other interested parties. This plan would have a beneficial impact on lagoon management. While the SCD Seismic Safety Project alternatives do not have an effect on the lagoon, in the past, the lack of bedload migration downstream of the Dam may has contributed to a lower volume of sand at the river mouth. The need for a Lagoon Management Plan may be a result of sediment deprivation. Under all project alternatives most, if not all, of the sediment reaching the Dam will no longer be held back by the Dam. This plan would require no additional mitigation for cumulative impacts, and is not addressed further in this EIR/EIS.

Growth within the Region

General growth within the region is included in the baseline (No Project Alternative). The need for the Proponent’s Proposed Project is to comply with DSOD requirements to improve the structure's ability to pass the Probable Maximum Flood and withstand the Maximum Credible Earthquake. It is not a water supply project and would not be expected to affect development conditions within the MPWMD boundaries or the CAW service area. No additional analysis of urban development is included in this EIR/EIS.

5.3.4 CUMULATIVE ASSESSMENT OF SIGNIFICANT ENVIRONMENTAL IMPACTS

This section provides an assessment of the cumulative impacts of the proposed San Clemente Dam Seismic Safety Project alternatives together with impacts of RFFAs in the region. Table 5.3-1 shows the candidate RFFAs arrayed against the environmental resources areas evaluated in Chapter 4 for the San Clemente Dam Seismic Safety Project.

Geology and Soils

There may be potential for cumulative impacts due to erosion during the construction period of RFFAs. Sediment would typically move quickly to low gradient sections of the river, where it could be retained for significant periods of time, depending on flow. If sediment contributed by RFFAs and roads accumulates in low gradient areas, this could have a multi-year impact on spawning.

This would be cumulatively considerable. The importance of the impact would depend on the overlap of construction projects in time and their proximity in space. However, even if projects are in close proximity and have overlapping construction times, standard erosion controls as discussed in sections 4.2 and 4.3 would be expected to implemented on most projects to mitigate effects such that there would not be a significant adverse cumulative increase in erosion within the watershed.

In terms of seismic stability, no significant adverse cumulative impacts would occur, and any seismic risks would be reduced as the SCD is strengthened, notched, or removed. No additional mitigation would be required for geology or seismicity.

Hydrology, Water Quality, and Sedimentation

The Proponent's Proposed Project and the action alternatives would have temporary adverse effects on water quality (suspended sediment and turbidity), lasting for the duration of construction. As discussed in sections 4.2 (Hydrology) and 4.3 (Water Quality), these construction impacts would be mitigated to a less than significant level to satisfy federal and state permitting requirements. Similar conditions would be required for other construction projects potentially affecting water quality, such that there would not be a significant adverse cumulative increase in erosion within the watershed.

Implementation of any of the San Clemente Dam Seismic Safety Project action alternatives would either restore natural basin hydrology below SCD (dam removal under Alternatives 2 or 3) or would have minimal effect on the existing operational flow releases from SCD (Proponent's Proposed Project, Alternative 1). The No Project Alternative (Alternative 4) would continue existing "interim" drawdown and flow releases. No cumulatively significant impacts on the hydrology of the Carmel River system would occur and no additional mitigation is necessary.

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Table 5.3-1: Summary of Potential for Cumulative Impacts from Reasonably Foreseeable Future Actions (San Clemente Dam Seismic Safety Project)

Reasonably Foreseeable Future Actions	Geology and Soils	Air Quality	Noise	Hydrology & Sediment	Water Quality	Aquatic Biology & Fish	Terrestrial Biology	Wetlands	Traffic & Circulation	Cultural Resources	Visual Quality
Monterey County General Plan Update	Eliminated from consideration for cumulative impacts: the Plan's guidance for growth is incorporated in 2030 baseline for environmental evaluation;										
Monterey Park Management Plan	Eliminated from consideration for cumulative impacts: no adverse cumulative effects identified										
Carmel Valley Master Plan	*Plan unlikely to affect geological features affected by project*	*Potential beneficial (offsetting) impact due to Plan policies addressing traffic*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Plan unlikely to affect hydrology or sediment transport in Carmel River reaches affected by project*	*Plan unlikely to have cumulative adverse effects on water quality parameters affected by project*	*Plan unlikely to have cumulative adverse effects on aquatic habitat or species affected by project*	*Plan unlikely to have cumulative adverse effects on terrestrial habitat or species within the area affected by the project*	*Plan unlikely to have cumulatively adverse effects on wetlands within the area affected by the project*	*Potential beneficial (offsetting) impact due to Plan policies addressing traffic*	*Plan unlikely to affect cultural resources in the APE*	*Plan unlikely to affect visual quality in viewsheds affected by the project*
Monterey County Development Projects: Rancho San Carlos Partnership	*Eliminated from further analysis because it has been inactive for more than two years and does not appear to be a RFFA. This project would occur in an existing developed area. The infrastructure is in, the only things that are being constructed would be the private homes and all of those sites have already been purchased.*										
Monterey County Development Projects: Carmel Valley Recreation and Parks Museum	*Eliminated from consideration for cumulative impacts: project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*										
Monterey County Development Projects: Garland Ranch Regional Park Addition	*Eliminated from consideration for cumulative impacts: project completed and included in baseline for environmental evaluation*										
Monterey County Development Projects: White Oak Plaza	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*	*Could add incremental effect to regional air quality*	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*	*Could add incremental effect to regional circulation*	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*	*Project occurs in existing developed area, with local effects unlikely to overlap geographically with the areas of effect of the project.*
Monterey County Development Projects: Rancho Cañada Village	*No potential impact: project features do not overlap geographically.*	*Consider Potential beneficial (offsetting) impact due to closure of golf course and traffic reduction No cumulative effect.*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Potential beneficial (offsetting) impact to hydrology due to water savings*	*Potential beneficial (offsetting) impact to water quality due to project mitigation and enhancement features*	*Potential beneficial (offsetting) impact due to project enhancement of steelhead habitat*	*Potential beneficial (offsetting) impact due to project enhancement of riparian habitat*	*Project unlikely to have cumulatively adverse effects on wetlands within the area affected by the project*	*Potential beneficial (offsetting) impact due to closure of golf course and traffic reduction*	*Project unlikely to have cumulatively adverse effects on San Clemente Dam Historic District*	*Project unlikely to affect visual quality in viewsheds affected by the project*
Monterey Integrated Regional Water Management Plan (incorporates the MPWMD Carmel River Management Program and the Carmel River Watershed Assessment and Action Plan)	*Plan unlikely to affect geological features affected by project*	*Plan unlikely to affect air quality affected by the project.*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Potential beneficial (offsetting) impact to hydrology and sediment*	*Potential beneficial (offsetting) impact to water quality*	*Potential beneficial (offsetting) impact to aquatic biology and fish*	*Potential beneficial (offsetting) impact to riparian systems*	*Potential beneficial (offsetting) impact to wetlands*	*Plan unlikely to have cumulatively adverse effects on traffic patterns at times and locations affected by the project*	*Plan unlikely to have cumulatively adverse effects on San Clemente Dam Historic District*	*Plan unlikely to affect visual quality in viewsheds affected by the project*
Regional Water Supply Projects Coastal Water Project	*No potential impact: project features do not overlap geographically.*	*Could add incremental effect to regional air quality*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Potential beneficial (offsetting) impact due to reduced pumping from wells*	*Potential beneficial (offsetting) impact due to reduced pumping from wells*	*Potential beneficial (offsetting) impact due to reduced pumping from wells*	*Project unlikely to have cumulative adverse effects on terrestrial habitat or species within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on wetlands within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on traffic patterns at times and locations affected by the project*	*Project unlikely to have cumulatively adverse effects on San Clemente Dam Historic District*	*Project unlikely to affect visual quality in viewsheds affected by the project*
Regional Water Supply Projects	*No potential impact:*	*Could add*	*No cumulative effects*	*Potential beneficial*	*Potential beneficial*	*Potential beneficial*	*Project unlikely to*	*Project unlikely to*	*Project unlikely to*	*Project unlikely to*	*Project unlikely to*

Table 5.3-1: Summary of Potential for Cumulative Impacts from Reasonably Foreseeable Future Actions (San Clemente Dam Seismic Safety Project)

Reasonably Foreseeable Future Actions	Geology and Soils	Air Quality	Noise	Hydrology & Sediment	Water Quality	Aquatic Biology & Fish	Terrestrial Biology	Wetlands	Traffic & Circulation	Cultural Resources	Visual Quality
North Monterey Desalinization	*project features do not overlap geographically.*	*incremental effect to regional air quality*	*on noise levels for sensitive receptors within the area affected by the project*	*(offsetting) impact if project serves CAW customers and reduces pumping*	*(offsetting) impact if project serves CAW customers and reduces pumping*	*(offsetting) impact if project serves CAW customers and reduces pumping*	*have cumulative adverse effects on terrestrial habitat or species within the area affected by the project*	*have cumulatively adverse effects on wetlands within the area affected by the project*	*have cumulatively adverse effects on traffic patterns at times and locations affected by the project*	*have cumulatively adverse effects on San Clemente Dam Historic District*	*affect visual quality in viewsheds affected by the project*
Regional Water Supply Projects Sand City Desalinization	*No potential impact: project features do not overlap geographically.*	*Could add incremental effect to regional air quality*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Project unlikely to have cumulative adverse effects on terrestrial habitat or species within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on wetlands within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on traffic patterns at times and locations affected by the project*	*Project unlikely to have cumulatively adverse effects on San Clemente Dam Historic District*	*Project unlikely to affect visual quality in viewsheds affected by the project*
Regional Water Supply Projects Phase 1 ASR	*No potential impact: project features do not overlap geographically.*	*Could add incremental effect to regional air quality*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Project unlikely to have cumulative adverse effects on terrestrial habitat or species within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on wetlands within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on traffic patterns at times and locations affected by the project*	*Project unlikely to have cumulatively adverse effects on San Clemente Dam Historic District*	*Project unlikely to affect visual quality in viewsheds affected by the project*
Regional Water Supply Projects Regional Urban Water Augmentation	*No potential impact: project features do not overlap geographically.*	*Could add incremental effect to regional air quality*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Potential beneficial (offsetting) impact if project serves CAW customers and reduces pumping*	*Project unlikely to have cumulative adverse effects on terrestrial habitat or species within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on wetlands within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on traffic patterns at times and locations affected by the project*	*Project unlikely to have cumulatively adverse effects on San Clemente Dam Historic District*	*Project unlikely to affect visual quality in viewsheds affected by the project*
Regional Water Supply Projects Seaside Basin Groundwater Replenishment	*No potential impact: project features do not overlap geographically.*	*Could add incremental effect to regional air quality*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Potential cumulative impact from winter diversions from the Carmel River*	*Potential cumulative impact from winter diversions from the Carmel River*	*Potential cumulative impact from winter diversions from the Carmel River*	*Project unlikely to have cumulative adverse effects on terrestrial habitat or species within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on wetlands within the area affected by the project*	*Project unlikely to have cumulatively adverse effects on traffic patterns at times and locations affected by the project*	*Project unlikely to have cumulatively adverse effects on San Clemente Dam Historic District*	*Project unlikely to affect visual quality in viewsheds affected by the project*
Carmel River Lagoon (Sand Bar) Management Plan	*Plan unlikely to affect geological features affected by project*	*No cumulative effect.*	*No cumulative effects on noise levels for sensitive receptors within the area affected by the project*	*Potential beneficial (offsetting) impact to hydrology and sediment impacts in the Carmel Lagoon*	*Potential beneficial (offsetting) impact to water quality in the Carmel Lagoon*	*Potential beneficial (offsetting) impact to aquatic biology and fish in the Carmel Lagoon*	*Plan unlikely to have cumulative adverse effects on terrestrial habitat or species within the area affected by the project*	*Potential beneficial (offsetting) impact to wetlands in the Carmel Lagoon*	*Plan unlikely to have cumulatively adverse effects on traffic patterns at times and locations affected by the project*	*Plan unlikely to have cumulatively adverse effects on San Clemente Dam Historic District*	*Plan unlikely to affect visual quality in viewsheds affected by the project*
Regional Growth	*Eliminated from consideration for cumulative impacts: included in 2030 baseline for environmental evaluation*										

Under the Proponent's Proposed Project, Dam Notching (Alternative 1), and No Project (Alternative 4), natural sediment loads delivered to San Clemente Reservoir would begin to pass downstream by about 2010 to 2015. Under Alternative 1, these loads would begin to pass soon after construction was completed. Under Alternatives 2 and 3, these releases could be increased in the short-term by additional sediments mobilized from restored stream channels upstream of SCD, and from the reestablishment of stream channels traversing the newly excavated sediment mass behind the Dam (Alternative 1). In addition, sluicing operations to maintain fish passage in the new fish ladder for Proponent Proposed Project and Alternative 1 could discharge up to 2.4 AF of sediment downstream of the Dam over a two-hour time period. Operation of sluice gates would likely occur once or twice a year over the life of the Dam.

The reintroduction of sediment to the lower Carmel River could have cumulative effects with other sediment sources to improve or degrade aquatic habitat. Currently, several reaches of the Carmel River are degrading due to the lack of sediment. This lack of sediment led the channel to erode and down-cut. Reintroducing a sediment supply to the lower reaches of the Carmel River will slow the channel erosion process, and may slowly bring the channel back to equilibrium. The addition of coarse sediment also will decrease the channel bed armoring process that is occurring in the reach downstream of the Dam. The approximately three mile reach between the Dam and Tularcitos Creek is armored with little or no gravel or sand. Restoring sediment in these size ranges would improve the riparian zone and steelhead spawning habitat (although it could initially reduce rearing habitat as interstitial spaces fill).

Most of the RFFAs identified would have beneficial effects on the stream channel and habitat of the lower Carmel River, which could offset any cumulative adverse effects that may occur. Proposed mitigation or enhancement measures for the action alternatives would be adequate to mitigate any potentially significant cumulative impacts on sediment transport and no additional mitigation of cumulative impacts is needed.

Fish and Aquatic Life

Several of the Regional Water Supply Projects include components that could reduce water demand from the Carmel River and help to augment dry season flows through the Carmel Valley. The Coastal Water Project, Sand City Desalinization, Phase 1 ASR, Seaside Basin Groundwater Replenishment and the Regional Urban Water Augmentation are expected to be online within 10 years. These projects provide for alternative water supplies (desalinization) and conjunctive use of groundwater storage facilities, surface water supplied from the Carmel River and water provided from desalination facilities to provide water to the Monterey Peninsula. Such projects would likely reduce summer water demand from CAW's production wells in the lower Carmel River and improve the amount and habitat quality for rearing juvenile steelhead. One concept would use a winter diversion from SCD or wells along the valley that would be stored as groundwater and then used during the low flow season. A winter diversion would need to be adequately screened and bypass flows established to protect steelhead, but in most years during winter, there is enough water in the river to support diverting some of the water without harming the river.

Two comprehensive management plans will also help to improve habitat conditions in the Carmel River and include the Monterey Integrated Regional Water Management Plan (incorporating the preceding MPWMD Carmel River Management Program). The Integrated Regional Water Management Plan addresses water use in the Carmel Valley and will potentially be beneficial to flows in the Carmel River. The MPWMD's Carmel River Management Program addresses habitat restoration work for steelhead and would potentially be beneficial to habitat conditions in the river. The Carmel River Lagoon (Sand Bar) Management Plan addresses habitat conditions in the Carmel River lagoon by managing the sand bar at the mouth. This plan would potentially improve habitat conditions in the lagoon which in some years provides important rearing habitat for juvenile steelhead.

Continued population growth in the area and the increase in the number and continued use of private wells sunk into the Carmel Valley aquifer may offset some of the gains to lower Carmel River habitat. Improved SCD fish passage facilities or dam removal would provide better access to upstream habitat for steelhead, potentially offsetting any potential significant adverse cumulative effects of the RFFAs on resources that may be affected by the action alternatives.

Vegetation and Wildlife

The effects of Proponent's Proposed Project and its alternatives on vegetation and wildlife would be geographically separated from those of other RFFAs, largely confined to the Project Area and access routes. No cumulative significant adverse impacts would occur and no additional mitigation measures are necessary.

Traffic

The Proponent's Proposed Project and its alternatives would result in a temporary increase in traffic levels, largely in the immediate Project Area and along access routes. These effects are expected to be largely separated in space and time from the traffic effects of other RFFAs. The existence of a significant cumulative impact caused by other projects does not mean that the incremental effects of the Proponent's Proposed Project are considerable (CEQA Guidelines, Sections 15064 and 15130). Currently some of the roads that would be used by the project alternatives and other RFFAs are at maximum capacity or may need improvements to handle projected traffic. It is possible that there could be a cumulative adverse impact on traffic. With the traffic mitigation measures contained in this EIR/EIS the contribution of the project alternatives to traffic impacts are less than significant. Similar conditions would be required for other construction projects which might mitigate impacts to traffic such that there would not be a significant adverse cumulative increase in traffic within the area

Air Quality

The action alternatives would have temporary adverse effects on air quality as a result of project construction activities. Generally these effects would be localized in the Project Area. The General Conformity Determination for the project alternatives found that emissions of nitrogen oxide (NO_X), reactive organic compound (ROC) and particulate matter of less than 10 microns (PM_{10}) would not interfere with attainment or maintenance or cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS) under the Clean Air Act (CAA) (see Appendix Y). The purpose of the general conformity review is to ensure that federal actions do not interfere with the emissions budgets in the California State Implementation Plan. These budgets consider cumulative effects.

Construction activities would generate temporary emissions from diesel-powered equipment and road dust. Fugitive dust, if not mitigated, could exceed the MBUAPCD construction threshold of significance for PM_{10}. In addition, estimated daily emissions from fuel combustion at the Dam and sediment handling could exceed the 137 pound per day level of significance for NO_X set by MBUAPCD. While the modeled concentration of NO_X, when added to the maximum recent historic background concentration, does not exceed an applicable standard, the MBUBAPCD has expressed concerns regarding the incremental addition of NO_X to regional air quality levels in an air basin that is non-attainment for the State ozone standard, To the extent that PM_{10} and No_X emissions by the project alternatives and RFFAs contribute to a regional incremental increase of NO_X, there could be a potential significant environmental impact on ambient air quality from project activities.

No additional mitigation measures beyond those in Section 4.7 have been identified.

Climate Change and Greenhouse Gas Emissions

The Global Warming Solutions Act of 2006 (AB 32) codifies California's goal of reducing statewide emissions of greenhouse gases (GHG) to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on global warming emissions that will be phased in starting in 2012 to achieve maximum technologically feasible and cost-effective GHG emission reductions. In order to effectively implement the cap, AB 32 directs the California Air Resources Board (CARB) to develop appropriate regulations and establish a mandatory reporting system to track and monitor global warming emissions levels.

As of the publication of this report, no rules or regulations have been promulgated by CARB or by any other state agency which defines a "significant" source of GHG emissions. In addition, there are no applicable facility-specific emission limitations or caps for GHG emissions, either statewide or at the local air district level. Thus, there is no regulatory or guidance mechanism for determining whether a project advances or hinders the GHG reduction goals of AB 32 (2006) and no standards of significance for GHG impacts have been established under CEQA. SB 97 (2007) requires the California

State Office of Planning and Research to prepare "guidelines for the mitigation of GHG emissions or the effects of GHG emissions" which will, in turn, be required by CEQA by July 2009, and certified and adopted by the Resources Agency by January 2010. Since the San Clemente Dam Seismic Safety Project was initiated under CEQA in 2005, and prior to the enactment of AB 32, the initial air quality impact evaluation for this project did not quantify GHG emissions, as discussed below.

Common GHGs include water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFC), hydrofluorocarbons (HFC), perfluorocarbons, sulfur hexafluoride (SF_6), ozone (O_3) , and aerosols. GHG are emitted by both natural processes and human activities. The accumulation of GHG in the atmosphere can increase the earth's temperature over time. GHG emissions from human activities, such as fossil-fueled generation of electricity and vehicle use, have elevated the concentration of these gases in the atmosphere, thus causing global warming (Association of Environmental Professionals [AEP] 2007). The principal GHG that enter the atmosphere because of human activities are:

- Carbon dioxide: CO_2 enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 also is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

- Methane: CH_4 is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills. For the Proponent's Proposed Project and the other action alternatives, methane is a very minor component of diesel GHG emissions, typically less than 0.05 percent[1].

- Nitrous oxide: N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Nitrous oxide comprises a small fraction of oxides of nitrogen (NO_X) emissions from combustion sources which are mainly nitric oxide (NO) and nitrogen dioxide (NO_2)[2].

- Fluorinated gases: Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are often used as substitutes for ozone-depleting substances (i.e., CFCs, HCFCs, and halons). These gases typically are emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as High Global Warming Potential gases ("High GWP gases") EPA 2006b).

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[1] "Compilation of Air Pollution Emission Factors (AP-42), Fifth Edition", EPA 1995 Tables 3.3-1 and 3.4-1

[2] NO_X from high-temperature sources is about 85 to 90 percent NO, about 9-14% NO_2, and less than 1 percent N_2O.

The GHG of most concern is CO_2 since it is released by the burning of fossil fuels (coal, oil, gas), can last in the atmosphere for centuries, and "forces" more climate change than any other GHG. In 2004, CO_2 accounted for 85 percent of the GHG emissions produced in the United States, and electrical generation accounted for 40 percent of those CO_2 emissions. In 2004, approximately 2.5 billion short tons of CO_2 were produced in the United States from electrical generation[3]. Therefore, approximately 6.3 billion short tons of CO_2 were emitted in the United States in 2004 from all sources. The California Energy Commission (CEC) has estimated that in 2004, the state emitted 542 million short tons of CO_2 equivalent GHG emissions (CEC 2006 Report), which is about 8.6 percent of the national total.

According to the AEP, there are currently no published thresholds or recommended methodologies for determining the significance of a project's potential cumulative contribution to global climate change (GCC) in CEQA documents. Even a very large individual project cannot generate enough GHG emissions to influence global climate change by itself. However, the effects of GHG have been cumulatively determined to have led to climate change on a global scale, which would be a significant cumulative effect. A project participates in this potential impact by its incremental contribution combined with the cumulative increase of all other sources of GHGs, which, when taken together, form global climate change impacts (AEP 2007). While short-term and temporary, this project could incrementally increase this significant cumulative impact, depending upon the source(s) of energy used in implementing the project.

The Proponent's Proposed Project would contribute to GHGs primarily through the use of diesel-powered construction equipment. Construction activities would be intermittent and would be completed after two to three construction seasons. There would be no long-term emissions (permanent sources) of GHGs from the Proponent's Proposed Project. Emissions associated with project-generated traffic would vary relatively little among the project alternatives. These small differences in emissions would have negligible effect on comparative and temporal ambient air quality impacts. Project impact assessment and mitigation described in Section 4.7 Air Quality, is based on a standard set of project traffic-related emissions measurements developed for to evaluate emissions effects from the Proponent's Proposed Project and all the project alternatives.

The combustion of diesel fuel in off road construction equipment and on road vehicles (trucks, etc.) would emit GHGs consisting mainly of carbon dioxide (CO_2), along with small amounts of methane (CH_4) and nitrous oxide (N_2O)[4]. Since emission factors for carbon dioxide are published by the EPA for diesel fuel combustion, GHG emissions are estimated for the project alternatives as carbon dioxide[5]. Since methane and nitrous oxide comprise less than 0.1 percent of GHG emissions from diesel fuel combustion,

[3] Electric power generators report carbon dioxide emissions to EPA pursuant to Title 40 CFR Part 75 requirements with reasonable accuracy.
[4] Over 99.9 percent CO_2 , less than 0.1 percent methane and nitrous oxide
[5] AP-42, Tables 3.3-1 and 3.4-1

they can be safely ignored in a screening level analysis such as the one performed for the project alternatives, even with their relatively higher GWP. Estimated carbon dioxide emissions for access road construction and for the project alternatives are shown in Tables 5.3-2 and 5.3-3, respectively.

Table 5.3-2: Estimated Carbon Dioxide Emissions Summary for Access Road Construction

Access Route	CO_2 lb/day	CO_2 tons/yr
San Clemente Drive (all project alternatives)	107	5.3
Tularcitos (Proponent's Proposed Project only)	101	5.1

Table 5.3-3: Estimated Carbon Dioxide Emissions Summary for Construction of Project Alternatives

Activity Area	CO_2 lb/day	CO_2 tons/yr
Site 4R (Alternatives 1, 2)	3,925	196
Dam Site (All project alternatives)	9,147	457

The project CO_2 emissions shown in Tables 5.3-2 and 5.3-3 above were estimated by computing and applying the ratio of CO_2 and sulfur dioxide (SO_2) emission factors, which are both fixed mass based factors (i.e., they are unaffected by variables such as temperature). The reference AP-42 factor for CO_2 is 164 pounds per million British Thermal Units (lb/mmBTU) and the SO_2 factor for California ultra-low sulfur (15 ppmw) diesel fuel is 1.55 x 10-3 lb/mmBTU. Thus, the SO_2 / CO_2 ratio is 9.5 x 10-6. Since SO_2 emissions were calculated for the initial 2005 CEQA analysis, estimated CO_2 emissions were obtained by dividing SO_2 emissions for each alternative by 9.5×10^6. This approach avoided the need to modify the entire emission calculation template for the project alternatives.

Notwithstanding the small amount of N_2O emissions relative to NO and NO_2, project applicants will discuss potential practical and cost effective NO_X controls for diesel vehicles and equipment, such as Viscon, (which could reduce NO_X emissions up to 25 percent) with the Monterey Bay Unified Air Pollution Control District (MBUAPCD) during project permitting. In addition, the project would comply with the following:

- Vehicle climate change standards: Assembly Bill (AB) 1493 (Pavley) required the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of climate change emissions emitted by passenger vehicles and light duty trucks. Regulations were adopted by CARB in September 2004.

- Heavy duty vehicle emission reduction measures: Increased efficiency in the design of heavy duty vehicles and an education program for the heavy duty vehicle sector. Vehicles accessing the project site are required to comply with emissions standards enforced by CARB.

- Diesel anti-idling: In July 2004, the CARB adopted a measure to limit diesel fueled commercial motor vehicle idling in order to cut emissions of diesel particulate matter (DPM). This measure also reduces GHG emissions.

While the activities of this project, by themselves, would not appear to be significant in their contribution to global GHG levels, the emissions from these activities may contribute to a cumulatively significant effect. Even with the mitigation discussed above, the emissions from this project when added to the emissions from other past, present, and probable future projects in the state would contribute to the increase in GHGs that are contributing to global climate change.

The California State Legislature has determined that global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California (Health and Safety Code Section 38501). Until further standards are set regarding impacts, the cumulative effect of increased GHG emissions would be a potential significant effect on the environment. Out of an abundance of caution, this EIR/EIS will regard any net contribution of GHG emissions to the air to be a potential significant cumulative effect of the project.

In the absence of established GHG thresholds, it is difficult to make conclusions about the magnitude of the impact and what are appropriate mitigation measures. CEQA recognizes that there are instances where appropriate mitigation for certain cumulative impacts involves the adoption of ordinances, guidelines, regulations, or other similar measures rather than the imposition of conditions on a project-by-project basis. There is recent state legislation which requires the setting of guidelines and standards on the effects and mitigation of GHG emissions by 2010; since these standards are not yet in effect, compliance with standards cannot be a mitigation strategy. Given the lack of standards at this time, and the fact that there are questions regarding specific mitigation actions, including possible GHG mitigation banking programs, there is considerable uncertainty regarding appropriate project specific mitigation for GHG emissions for projects of this kind. The action alternatives may contribute a relatively small, short-term contribution to GHG emissions. As of the publication of this report, no additional mitigation measures beyond those set forth in Section 4.7 on air quality have been identified.

Noise

The project alternatives would have temporary adverse effects on noise as a result of project construction activities. These effects would be localized in the Project Area and separated from the effects of other RFFAs. No cumulative significant impacts would occur and no additional mitigation measures are necessary.

Aesthetics

The visual impacts of the project alternatives would be limited to the viewsheds in the Project Vicinity and would not contribute to a cumulative decline in visual quality outside of the Project Area. The project is located outside of any public viewing area, and post-project views will be very similar to pre-project conditions. Project alternatives would have temporary adverse aesthetic effects in the Project Area as a result of project construction activities. These effects would be localized in the Project Area and separated from the effects of other RFFAs. No cumulative significant impacts would occur and no additional mitigation measures are necessary.

Cultural Resources

The projects described in Table 5.1-1 could contribute to a cumulative loss of cultural resources in the Carmel Valley. The proposed mitigation measures reduce the potential adverse effects on cultural resources in the vicinity of SCD to less than significant levels. In addition, an additional mitigation measure has been proposed to address site CA-MNT-33, as described below.

There presently exists a highly significant site (CA-MNT-33) (comprising two large midden areas) that has been subjected to a wide range of impacts from past and present activities in the vicinity of the CVFP. Although the direct impacts from the Proponent's Proposed Project would be mitigated to a less than significant level, these impacts would contribute to a cumulative loss of cultural resources at siqIn order to avoid this cumulative impact, a management plan should be developed that would assist the applicant in protecting the site. This plan should define the boundaries of the site, indicate where intact and significant deposits are likely to be preserved, define management protocols for protecting the site, and define a standard for assessing the success of the management protocols. The management protocols should include reviewing all ground disturbing activities to avoid impacts on significant buried and surface deposits, removing or re-siting existing facilities or equipment where possible, storing construction materials and equipment offsite, and providing an education program to applicant staff members charged with oversight of the facility to prevent adverse impacts from incidental activities or vandalism. With implementation of the mitigation measures contained in this EIR/EIS and the management plan for resources is *de minimus* and is not cumulatively considerable. No additional mitigation measures could be required or recommended.

Public Health and Safety

The project alternatives benefit public health and safety by avoiding the potential for dam failure during a MCE or PMF. No additional mitigation measures are necessary.

Land Use, Planning, and Recreation

The project alternatives are not anticipated to have an adverse impact on land use, planning or recreation, and would not affect planned land uses. The cumulative impact associated with the project alternatives and other RFFAs is not significant. No additional mitigation measures are necessary.

Conclusions

The existence of a significant cumulative impact caused by other projects does not mean that the incremental effects of the project alternatives are considerable (CEQA Guidelines, Sections 15064 and 15130). The project alternatives' contribution to impacts would be less than cumulatively considerable in combination with other projects and thus not significant with the possible exception of air quality and GHG emissions.

No additional mitigation measures beyond those contained in this EIR/EIS are required to address the incremental contribution of the Proponent's Proposed Project to cumulative impacts. However, it is recommended that a management plan be developed by the applicant to provide protection for a significant cultural resource (CA-MNT-33), located in the vicinity of the CVFP as outlined in the cultural resources discussion above.

5.4 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible or irretrievable commitment of resources refers to impacts on or losses to resources that cannot be recovered or reversed. Examples of such impacts would be the extinction of a species or permanent conversion of wetlands to fill. In either case, the loss would be permanent.

The project alternatives would require an irretrievable commitment of natural resources from direct consumption of fossil fuels and construction materials (see Section 5.5). The construction and operation of the San Clemente Dam Seismic Safety Project alternatives could result in the destruction of aquatic or terrestrial life, or the commitment of other resources as described below.

5.4.1 GEOLOGY

Under Alternative 3, the topography of the saddle separating the Carmel River and San Clemente Creek would be irreversibly altered by blasting to create a diversion bypass channel. This is not considered a significant adverse environmental impact.

5.4.2 AQUATIC BIOLOGY

Under the Proponent's Proposed Project, a fish ladder would continue to provide passage upstream, but would not be equivalent to passage in a free flowing stream. Under Alternative 1, a fish ladder would continue to provide passage upstream, but would not be equivalent to passage in a free flowing stream.

Alternative 2 would restore the river to a free-flowing stream. All sediment trapped in the reservoir would be stored at a site upstream of the location of the current reservoir.

Under Alternative 3, about 2,350 feet of Carmel River would be permanently committed to channel sediment storage and dike construction. This portion of the Carmel River would be permanently bypassed by cutting a 450-foot-long channel between the Carmel

River and San Clemente Creek. The bypassed portion of the Carmel River would be used as a sediment disposal site for the accumulated sediment.

5.4.3 VEGETATION AND WILDLIFE

Site 4R would be committed to use for sediment disposal under Alternatives 1 and 2. The site would be filled by up to 2.5 million cubic yards (1,555 AF) of accumulated sediment removed from behind the Dam). The footprint area of the sediment pile would be up to 23 acres. This site is located in a relatively steep, undeveloped, forested ravine approximately 3,500 feet east of San Clemente Reservoir. The ravine supports an ephemeral stream that carries local runoff during storm events. The watershed area tributary to the sediment pile site is approximately 252 acres.

Along access roads that are widened or constructed, terrestrial habitat would be committed to transportation use.

5.4.4 CULTURAL RESOURCES

The alterations that would be made to SCD and OCRD (historic dams) and their associated fish ladders, as well as impacts to the character and visual integrity of associated features of the SCD Historic Resource District represent irreversible commitments of cultural resources.

5.5 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Effects on resources are often characterized with respect to their being of short or long-term duration. This section, highlighting some of the broader relationships between short and long-term effects, is not intended to repeat analyses already provided. Rather, this section presents some of the tradeoffs in the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity of resources. An important consideration when analyzing the effects of a Proponent’s Proposed Project or an action alternative is whether it would result in short-term environmental effects (adverse or beneficial) to the detriment of achieving long-term or maximizing productivity of these resources. Short-term refers to the duration of construction of the San Clemente Dam Seismic Safety Project alternatives and long-term refers to an indefinite period following the implementation of the project.

The construction of the Proponent’s Proposed Project or action alternatives, including dam retrofit or removal, sediment transport and disposal, and access road improvements would cause minor, localized effects. Most of these would be short-term, although as described above (Section 5.4), sediment disposal would entail long-term commitments of terrestrial or aquatic sites. Where sites or routes are permanently altered, such as the construction of the thickened dam, construction of the new Tularcitos Access Route or sediment storage at Site 4R, long-term commitments of aquatic and/or terrestrial resources would be made.

Long-term environmental gains are expected for anadromous fish using the Carmel River because of improved fish passage. The extent of these gains vary depending on whether passage is provided by improving the fish ladder (Proponent's Proposed Project and Alternative 1) or removing the Dam (Alternatives 2 and 3). Net improvements to fish passage are realized even where the Dam is retained and the fish ladder and SOMP (see Appendix J) are used to maintain fish passage over the Dam and upstream through the sediment delta.

5.6 NATURAL OR DEPLETABLE RESOURCES

The project would consume minor amounts of depletable fossil fuels in transporting construction workers to work sites, excavating sediment, and transporting sediment by truck or conveyor belt to disposal sites. The Proponent's Proposed Project would consume about 10,000 tons of coarse aggregate, 5,000 tons of sand, 24,000 sacks of cement, and 8,000 sacks of fly ash to produce approximately 5,800 cubic yards of concrete for the Dam and 1,400 cubic yards for the fish ladder. The project would not increase the consumption of other natural resources.

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CHAPTER 6.0

LISTS AND REFERENCES

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6.1 LIST OF PREPARERS

Jillian Aldrin — Staff Scientist, ENTRIX, Inc. Hydrology, sediment transport, flooding. Education: M.A., Geography (Fluvial Geomorphology), University of Texas, Austin; B.A., Environmental Studies/Hydrology, University of Colorado, Boulder. 5 years experience.

Chelsea Ayala — Project Scientist, ENTRIX, Inc. Air quality. Education: B.A., Environmental Studies, Geology minor, California State University, Sacramento. 13 years experience.

Sean Barry — Project Scientist, ENTRIX, Inc. Herpetofauna. Education: M.S., Zoology, University of California, Davis. 29 years experience.

Jean Baldridge — Senior Consultant/Senior Staff Project Scientist, ENTRIX, Inc. Aquatic resources. Education: M.S., Fisheries, University of Washington, Seattle. 25 years experience.

Brad Boyes — Senior Project Engineer, ENTRIX, Inc. Air quality. Education: M.B.A., Project Management, Pepperdine University, Malibu; B.S., Environmental Engineering, California Polytechnic State University, San Luis Obispo. 25 years experience.

Keven Ann Colgate — Senior Staff Environmental Scientist, ENTRIX, Inc. Terrestrial biology field technician. Education: M.S., Natural Resource Management, California Polytechnic State University, San Luis Obispo. 5 years experience.

Jean Cziesla — Project Scientist, ENTRIX, Inc. Cultural resources, visual quality, architectural historian/land use planner. Education: M.S., Historic Preservation of Architecture, M.C.R.P., Community and Regional Planning, University of Oregon, Eugene; B.A., Art History, University of Virginia, Charlottesville. 9 years experience.

Paula DeMichele — Production Specialist, ENTRIX, Inc. Technical editing and production. Education: B.A., Communications and Management, State University of New York at Buffalo. 8 years experience.

Kimberley Demuth — Senior Consultant, ENTRIX, Inc. Cultural resources team leader, visual quality. Education: M.S., Historic Preservation of Architecture, University of Oregon, Eugene. 26 years experience.

Susan Fregien — Project Scientist, ENTRIX Inc. Water quality. Education: M.S., Aquatic Ecology, University of Washington. 12 years experience.

Booker Holton — Principal, TOVA Applied Science & Technology. Environmental justice. Education: Ph.D., Ecology, University of California, Davis. 27 years experience.

Sandee Hufana — Staff Scientist, ENTRIX, Inc. Quality assurance and quality control. Education: M.S., Environmental Management, University of San Francisco. 9 years experience.

Vik Iso-Ahola, P.E. — Project Engineer, Montgomery, Watson and Harza. Education: MBA; B.S., Civil Engineering. 8 years experience.

Gretchen Lebednik — Senior Biologist, ENTRIX, Inc. Terrestrial team leader, rare plants, wetlands. Education: M.S., Botany, University of Washington. 13 years experience.

Jim Loucks — Construction Cost Estimator, Montgomery, Watson and Harza. Education: B.S., Construction Management. 20 years experience.

Rick McCartney — Senior Project Scientist, ENTRIX, Inc. Geology. Education: M.S., Geology; Miami University; B.S., Geology, St. Lawrence University. 17 years experience.

Jenner McCloskey — Senior Aquatic Scientist, ENTRIX, Inc. Aquatic toxicology, water quality. Education: M.S., Environmental Management, University of San Francisco. 10 years experience.

Marcia Montgomery — Project Historian, ENTRIX, Inc. Cultural resources reporting. Education: M.A., American History, Washington State University, Pullman; B.A., History, Lewis and Clark College. 13 years experience.

Shruti Mukhtyar — Staff Scientist, ENTRIX, Inc. GIS. Education: M.S., Remote Sensing & Geographic Information Science & Technology, University of Wisconsin-Madison. 4 years experience.

Rebecca Nielsen — ENTRIX, Inc. Cultural Resources. Education: M.S., Historic Preservation of Architecture, Cultural Resources. 10 years experience.

Brenda Peters — Senior Consultant, NEPA/CEQA Compliance, ENTRIX, Inc. Education: M.P.A., Public Administration, California State University, San Francisco; B.A., Environmental Studies and Sociology, University of California, Santa Barbara. 25 years experience.

Jeremy Pratt — Senior Consultant, ENTRIX, Inc. Project management, EIS coordination, scoping. Education: M.S., Environmental Science, Washington State University. 29 years experience.

Christie Robinson — Deputy Project Manager/Senior Project Scientist, ENTRIX, Inc. Fisheries, aquatic biology. Education: B.A., Aquatic Biology, University of California, Santa Barbara. 16 years experience.

Mike Rudd — Senior Consultant, Engineering, ENTRIX, Inc. Civil Engineering, stream and wetland restoration, hydrology and water resources. Education: B.S., Agricultural Engineering, Cal Poly State University, San Luis Obispo. 18 years experience.

Brett Rushing —ENTRIX, Inc. Archaeological surveys, cultural resource assessments and permitting. Education: M.A., Anthropology, California State University, San Francisco. 8 years experience.

Ruth Sudermeyer — Project Scientist, ENTRIX, Inc. Terrestrial biology, wetlands. Education: M.S., Conservation Biology, San Jose State University. 8 years experience.

Bashar Sudah, E.I.T — Staff Engineer, Montgomery, Watson and Harza. Education: B.S., Civil Engineering. 2 years experience.

J. Daniel Takacs, TE — Principal Associate, Higgins Associates. Education: M.S., Civil Engineering, University of Maryland; B.S., Transportation Engineering, California Polytechnic State University, San Luis Obispo. 29 years experience.

Tom Taylor — Senior Consultant, ENTRIX, Inc. Fisheries, aquatic biology. Education: M.S., Aquatic Ecology, University of California at Davis; B.A., Biology, California State University, Fresno. 25 years experience.

Dan Tormey — Senior Consultant, ENTRIX, Inc. Geology. Education: Ph.D., Geology and Geochemistry, Massachusetts Institute of Technology. 16 years experience.

Daniel L. Wade, P.E., G.E. — Regional Manager, Montgomery, Watson and Harza. Dams and hydro engineering services. Education: M.S. and B.S., Civil/Geotechnical Engineering. 16 years experience.

Paul Wisheropp — Senior Consultant, ENTRIX, Inc. Hydrology, sediment transport, flooding. Education: M.S., Civil Engineering (Water Resources), Colorado State University; B.S., Environmental Engineering, Humboldt State University. 25 years experience.

Kevin Wright — Senior Project Scientist, ENTRIX, Inc. Air quality conformity analysis. Education: B.S., Environmental Sciences, B.S., Science Education, University of Maryland. 20 years experience.

Rob Wurgler — Production Specialist, ENTRIX, Inc. Document production assistance. Education: B.A., Visual Communication, California State University. 13 years experience.

Vernal L. Yadon — Rare plant surveys. Education: M.S., Fish and Game Management, Oregon State University. 40 years experience.

6.2 LIST OF AGENCIES AND ORGANIZATIONS CONSULTED

Allen Matkins Leck & Gamble
Jan Driscoll
501 West Broadway, 9th Floor
San Diego, CA 92101-3577

California American Water
Steve Leonard, General Manager & Vice President
John Klein, Senior Operations Engineer
Fred Feizollahi, Senior Operations Engineer
Dr. Peter Spillett, Director, Environmental Projects
50 Ragsdale Drive, Suite 100
Monterey, CA 93942-0951

California Department of Fish and Game
Central Coast Region
Robert Floerke
Serge Glushkoff
Carl Wilcox
P.O. Box 47
Yountville, CA 94599

California Department of Fish and Game
Central Coast Region
Mike Hill, Associate Fishery Biologist
897 Oak Park Blvd., #259
Pismo Beach, CA 93449

California Department of Parks and Recreation
Office of Historic Preservation
Dr. Mildford Donaldson
Dwight Dutschke
1416 9th Street, Room 1442-7
Sacramento, CA 95814

California Department of Water Resources, San Joaquin District
Paula Landis, District Chief
Charyce Hatler, Environmental Specialist
3374 East Shields Avenue
Fresno, CA 93726-6913

California Department of Water Resources, Division of Safety Of Dams
David Gutierrez, Chief, Division of Safety of Dams
Richard Olebe
Y-Nhi Enzler, Project Engineer
2200 X Street, Suite 200
P.O. Box 942836

Sacramento, CA 94236-0001

California Public Utilities Commission
Energy Division
Andrew Barnsdale
Fred Curry
505 Van Ness Avenue
San Francisco, CA 94102

Central Coast Regional Water Quality Control Board
Chris Adair, Senior Water Resource Control Engineer
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401

Monterey Bay Unified Air Pollution Control District
24580 Silver Cloud Court
Monterey, CA 93940

Monterey County Department of Public Works
Neal Thompson, Traffic Engineer
W 168 Alisal St, 2nd Floor
Salinas, CA 93901

Monterey County Department of Planning and Building Inspection
Jim DiMaggio
Bill Hopkins, Senior Planner
Lynne Mounday, Planning and Building Services Manager
168 W. Alisal Street
Salinas, CA 93901

Monterey County Department of Water Resources
Al Mulholland
P.O. Box 930
893 Blanco Circle (93901)
Salinas, CA 93902

Monterey Peninsula Regional Park District
Tim Jensen, Planning and Programs Manager
60 Garden Court, Suite 325
Monterey, CA 939440

Monterey Peninsula Water Management District
Dave Burger, General Manager
Dave Dettman, Senior Fisheries Biologist
Darby Fuerst, Senior Hydrologist
Larry Hampson, Water Resources Engineer
Henrietta Stern, Project Manager
5 Harris Court, Bldg G
P.O. Box 85
Monterey, CA 93942-0085

Nason Family (Tom Little Bear, Fred, and Jessie)
Esselen Tribe
38655 Tassajara Road
Carmel Valley, CA 93924

NOAA Fisheries
Protected Resources Division
Joyce Ambrosius
Brian Cluer
Jason Kahn
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404-6528

Ohlone Costanoan Esselen National
Rudolph Rosales, Tribal Chair
P.O. Box 1301
Monterey, CA 93942

U.S. Army Corps of Engineers
San Francisco District
Robert Smith
Phelicia Thompson
333 Market Street
San Francisco, CA 94105

U.S. Fish & Wildlife Service
Ventura Fish and Wildlife Office
Roger Root
2493 Portola Road, Suite B
Ventura, CA 93003

6.3 REFERENCES

Alley & Associates. 1992. Instream Flow Analysis of Steelhead spawning habitat between Scartlett Narrows and San Clemente Dam Carmel River, Monterey County, California, 1991. Report prepared for the Monterey Peninsula Water Management District. Project #108-1.

Alley & Associates. 1998. Determination of weighted usable spawning area for steelhead in two stream segments- the Scartlett Narrows to San Clemente Dam and between San Clemente and Los Padres Dam, Carmel River, Monterey County, California. Report prepared for the Monterey Peninsula Water Management District. Project #153-01.

American Association of State Highway and Transportation Officials. 2001. Guidelines for Geometric Design of Very Low- Volume Local roads (ADT<400).

Archaeological Consulting. 1987a. Archaeological Site Record. Carmel Valley, Monterey. #CA-MNT-812H.

Archaeological Consulting. 1987b. Archaeological Site Record. Carmel Valley, Monterey. #CA-MNT-1249H.

Barbara A. Plog, ed. 1988. Fundamentals of Industrial Hygiene, 3rd Edition. National Safety Council, Table 9-b, page 168.

Barnhart, R. A. 1986. Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Pacific Southwest): Steelhead. U.S. Fish and Wildlife Service Biological Report (82) 11. U.S. Army Corps of Engineers, TR EL-82-4. 21 pp.

Barry, S. J., and H. B. Shaffer. 1994. The status of the California tiger salamander (*Ambystoma californiense*) at Lagunita: a 50-year update. Journal of Herpetology 28:159-164.

Barry, S. J. 1999. A Study of the California Red-Legged Frog (*Rana aurora draytonii*) of Butte County, California. PAR Environmental Services, Sacramento, CA.

Bell, M.C. 1986. Fisheries Handbook of Engineering Requirements and Biological Criteria. U.S. Army Corps of Engineers, North Pacific Division, Portland, OR.

Bell, M.C. 1991. Fisheries Handbook of Engineering Requirements and Biological Criteria. U.S. Army Corps of Engineers, North Pacific Division, Portland, OR.

Bennyhoff, James A, and Richard E. Hughes. 1987. Shell Bead and Ornament Exchange Networks between California and the Western Great Basin. Anthropological Papers of the American Museum of Natural History 64 (Part 2):79-175.

Bergstedt, L. C. and E. P. Bergersen. 1997. Health and movements of fish in response to sediment sluicing in the Wind River, Wyoming. Can. J. Fish. Aquat. Sci. 54: 312–319.

BioSystems Analysis, Inc. 1991. Canada Reservoir Project Biological Assessment. Consultants report. Santa Cruz, CA.

Bjornn, T.C., and D. W. Reiser. 1991. Habitat Requirements of Salmonids in Streams, In: *Influcences of Forest and Rangeland Mangement on Salmonid Fishes and Their Habitats*, American Fisheries Society Special Publication 19, W.R. Meehan, Editor pp 83-138, 1991.

Bowen, O.E., Jr., 1965, Stratigraphy, structure, and oil possibilities in Monterey and Salinas quadrangles, California: American Association of Petroleum Geologists, 40th annual meeting, Pacific Section, Bakersfield, CA, p. 48-67.

Bowen. O.E. Jr. 1969. Geologic map of the Monterey 7.5-minute quadrangle: California.

Buchanan-Banks, J.E., E.H. Pampeyan, J.C. Wagner, and D.S. McCulloch. 1978. Preliminary map showing recency of faulting in coastal south-central California: U.S. Geological Survey Miscellaneous Field Studies Map MF-910. Division of Mines and Geology unpublished map, scale 1:24,000.

Brinson, M.M., R.D. Rheinhardt, F.R. Hauer, L.C. Lee, W.L. Nutter, R.D. Smith, and D. Whigham. 1995. A guidebook for application of hydrogeomorphic assessments to riverine wetlands. Tech. Rep. WRP-DE-11. US Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

Bruel & Kjaer. 1971. Acoustic Noise Measurements, Figure 2-10, page 20.

California Academy of Sciences (CAS). 2005. Online collections catalogue, Department of Herpetology, San Francisco, CA. Available at: http://calacademy.org/research/herpetology/catalog/.

California Air Resources Board (CARB). 2005. Ambient Air Quality Standards. Available at http://www.arb.ca.gov/research/aaqs/aaqs.htm.

California Air Resources Board (CARB). 2007. Ambient Air Quality Standards. Available at http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

California American Water Company. 1975. Sketch map San Clemente Dam and nearby buildings, drawing no. B-435. On file in an unlabeled folder at California American Water Company, Monterey, CA.

California American Water Company. 1981. Proposed Capital Improvement Project. On file in the Cal-Am History folder at California American Water Company, Monterey, CA.

California American Water Company. No date. California American Water Company Monterey District - History. On file in the Cal-Am History folder at California American Water Company, Monterey, CA.

California American Water Company. No date. Topographic map. On file in an unlabeled folder at California American Water Company, Monterey, CA.

California Code of Federal Regulations. Title 14. Article 9. Contents of Environmental Impact Reports. Section 15124 (b). Amended July 27, 2007.

California Department of Fish and Game (CDFG). 2005a. California Natural Diversity Data Base Rare Find Report for Carmel Valley, Big Sur, Chews Ridge, Chualar, Mount Carmel, Rana Creek, Seaside, Sprekels, Ventana Cones Quadrangles. CDFG Natural Heritage Division, Rancho Cordova, CA.

California Department of Fish and Game (CDFG). 2005b. State of California, Resources Agency, Department of Fish and Game Habitat Conservation Division, Wildlife and Habitat Data Analysis Branch California Natural Diversity Database. Special Animals. July 2005. Available at: http://www.dfg.ca.gov/whdab/pdfs/SPAnimals.pdf.

California Native Plant Society (CNPS). 2001. Inventory of rare and endangered plants of California (6th edition, electronic version). Rare Plant Scientific Advisory Committee, David P. Tibor, convening editor. California Native Plant Society, Sacramento, CA.

California Natural Diversity Database (CNDDB). 2005. California Department of Fish and Game.

California Public Resources Code. 2004. Section 21083.4.

California Water and Telephone Company. 1954. Management Team. History of California Water and Telephone Company. On file in the Cal-Am History folder at California American Water Company, Monterey, CA.

Call, M. W. 1978. Nesting habits and survey techniques for common western raptors. U. S. Dep. Inter., Bur. Land Manage., Portland, OR. Tech. Note No. 316. 115 pp.

Chadwick and Sykes, Inc. 1920. Specifications of Material and Labor for the construction of the San Clemente Dam for the Del Monte Properties Company. On file in the Cal-Am Agreement-Construction of San Clemente Dam folder at California American Water Company, Monterey, CA.

Clark, J.C., T.W. Dibblee, Jr., H.G. Greene, and O.E. Bowen, Jr. 1974. Preliminary geologic map of the Monterey and Seaside 7.5-minute quadrangles, Monterey County, Calif., with emphasis on active faults: U.S. Geological Survey Miscellaneous Field Studies Map MF-577, 2 plates, scale 1:24,000.

Cockerham, R.S., D.S. McCulloch, and H.G. Greene. 1990. Earthquake epicenters and selected fault plane solutions of the central California continental margin. In H.G. Greene and M.P. Kennedy, eds., Geology of the central California continental margin: California Division of Mines and Geology California Continental Margin Geologic Map Series, Map 5B, scale 1:250,000.

Compton, R.R. 1966. Analyses of Pliocene-Pleistocene deformation and stresses in northern Santa Lucia Range, California. In Geological Society of America Bulletin, Vol. 77, p. 1361-1380.

Converse Consultants. 1982. New San Clemente Project, Geotechnical Studies for the Environmental Impact Report. May.

Council on Environmental Quality (CEQ). 1997. Guidance Under NEPA. Washington, D.C.

Cowardin, L. M., V. Carter, F. Golet, and E. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C.

Denise Duffy & Associates, Inc. (Duffy). 2000. Recirculated Draft Environmental Impact Report for the Seismic Retrofit of the San Clemente Dam. Unpublished report prepared for the California Department of Water Resources. Sch #97042007, September, 2000.

Department of Water Resources. 2002. San Joaquin District Environmental Services, Carmel River Valley, San Clemente Dam, Potential Sediment Disposal Sites, map/table dated May 8.

Dettman, D.H. and D.W. Kelley. 1986. Relationship between steelhead sport catch, angling success, and streamflows in the Carmel River during 1984. Appendix F to the Assessment of the Carmel River Steelhead Resource, Vol. 1. Biological Investigations. Final Report. Prepared for the Monterey Peninsula Water District. September, 1986.

Dettman, D. 1990. Technical Memorandum 90-01 Spawning Habitat Mitigation Plans for Alternative Water Supply Projects in the Carmel River Basin. Prepared for the Monterey Peninsula Water District.

Dibblee, T.W., Jr. 1976. The Rinconada and Related Faults in Southern Coast Ranges, California, and their Tectonic Significance. U.S. Geological Survey Technical Paper.

Dibblee, T.W., Jr. 1999. Geologic Map of the Monterey Peninsula and Vicinity.

Ecosystems West. 1997. Biological inventory of the San Clemente Reservoir seismic retrofit project study area. Unpublished report prepared for Denise Duffy and Associates, October 30, 1997.

Edwards, Robert L., Patricia P. Hickman, and Gary S. Breschini. 1974. Assessment of the Impact on the Cultural Resources of the Proposed San Clemente Dam, Upper Carmel Valley, Monterey County, California. Report on file at Northwest Information Center (NWIC), Rohnert Park, CA.

ENTRIX, Inc. 2000. Final biological assessment for the seismic retrofit of San Clemente Dam. April 2000.

.ENTRIX, Inc. 2002. Revised Final Report for the 2003 San Clemente Dam Drawdown Project. Prepared for California American Water Company and U.S. Army Corps of Engineers.

ENTRIX, Inc. 2003a. Biological Assessment for the San Clemente Drawdown Project, 2003-2004. Prepared for U.S. Army Corps of Engineers and U.S. National Marine Fisheries Service. February 2003.

ENTRIX, Inc. (with Ecological Studies and Califauna). 2003b. Revised Final Report for the San Clemente Dam Drawdown Project, June-July 2003. Prepared for U.S. Army Corps of Engineers, on behalf of California American Water Company.

ENTRIX, Inc. 2004a. San Clemente Dam 2004 Drawdown Project, Amended Project Description for Operations and Monitoring. March 2004.

ENTRIX, Inc. 2004b. Draft Report for the San Clemente Dam Drawdown Project, May – June 2004. Prepared for U.S. Army Corps of Engineers, on behalf of California American Water Company. August 2004.

ENTRIX, Inc. 2004c. Draft Biological Assessment for the San Clemente Dam Drawdown Project, 2005 – 2007. Prepared for U.S. Army Corps of Engineers, on behalf of California-American Water Company. October 2004.

ENTRIX, Inc. 2005a. Draft Report for the San Clemente Dam Drawdown Project, July-August 2005, Carmel River, Monterey County, California. Prepared for the U.S. Army Corps of Engineers, San Francisco, CA, on behalf of California American Water Company.

ENTRIX, Inc. 2005b. pers. comm. between David Norris, consultant to California American Water Company and Marcia Montgomery, ENTRIX, Inc., August 2, 2005.

ENTRIX, Inc. 2006. Report for the San Clemente Dam Drawdown Project, June-August 2006. Prepared for the U.S. Army Corps of Engineers, San Francisco, CA, on behalf of California American Water Company. October 2006.

Executive Order 12898 on *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* with accompanying Memorandum. February 11, 1994.

Farley, Stafford, Gurcke, and Gingg. 1974. Site Record for CA-MNT-814. On file at Northwest Information Center (NWIC), Rohnert Park, CA.

Fenenga, G.L. 1988. An Analysis of the Shell Beads and Ornaments from CA-MNT-33a, Carmel Valley, Monterey County, California. In Analyses of South-Central California Shell Artifacts, Gary S. Breschini and Trudy Haversat, eds. Coyote Press Archives of California Prehistory 23:87-106.

Froke, J.B. 2004. Final report for the San Clemente Dam Drawdown Project, 2004, California red-legged frog, Carmel River, Monterey County, California. Prepared for the U.S. Army Corps of Engineers, San Francisco, CA. Prepared with support from Dawn Reis Ecological Studies. Prepared on behalf of California American Water Company, Monterey, CA.

Froke, J.B. 2005. Summary of CRLF data from 2005 San Clemente Dam Drawdown Project: Reis & Froke. Email to Christie Robinson, ENTRIX, Inc. June 4, 2007.

Froke, J.B. 2007. Protection of California red-legged frogs in the Carmel River during the 2006 drawdown of the San Clemente Reservoir, Monterey County, California. Submitted to California American Water Company, Monterey, CA, and U.S. Fish & Wildlife Service, Ventura, CA.

Geomatrix Consultants. 1985. Evaluation of Seismic Design Criteria New San Clemente Dam. May.

Greene, H.G., W.H.K. Lee, D.S. McCulloch, and E.E. Brabb. 1973. Faults and earthquakes in the Monterey Bay region, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-518, 14 p., 4 map sheets, scale 1:200,000.

Grinnell, J. and A. H. Miller. 1944. The distribution of the birds of California. Pac. Coast Avifauna No. 27. 608pp.

Hampson, Paul, MaryEllen Ryan, Gary Breschini and Trudy Haversat. 1987. Archaeological and Historical Investigations for the San Clemente Dam EIR/EIS, Carmel Valley, Monterey County California.

Hanna, Beverly M., and Dave H. Dettman. 1993. Description of the Sleepy Hollow Steelhead Rearing and Holding Facility. MPWMD Planning Memorandum 93-1.

Harvey, B. C. and T. E. Lisle. 1998. Effects of suction dredging on streams: a review and an evaluation strategy. *Fisheries* 23(8):8-17.

Hayes, M.P. and M.R. Jennings. 1988. Habitat correlates of distribution of the California red-legged frog (*Rana aurora draytonii*) and the foothill yellow-legged frog (*Rana boylii*): Implications for management. Proceedings of the Symposium on the Management of Amphibians, Reptiles, and small mammals in North America. U.S.D.A. Forest Service General Technical Report RM-166.

Henny, C. J., and R. G. Anthony. 1989. Bald eagle and osprey. National Wildlife Federation scientific and technical series 12:66-82.

Hickman, J. C., ed. 1993. The Jepson manual higher plants of California. University of California Press, Berkeley, CA.

Higgins & Associates. 1998. Study report.

Highway Research Board. 1971.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Sacramento: California Department of Fish and Game.

Holland, Dan C. 1994. The Western Pond Turtle: Habitat and History. Final Report Portland, OR: U.S. Department of Energy, Bonneville Power Administration.

Howard, Donald M. 1974. MNT-350, The Cal-Am Filter Plant Site. In Archaeology in Paradise, by D. M. Howard, pp. 39-41. Antiquities Research Publications, Carmel, CA.

Idriss, I. M. 1985. "Evaluating Seismic Risk in Engineering Practice." In Proceedings of the 11th International Conference on Soil Mechanics and Foundation Engineering, Vol 1, p. 155.

Ingles, L.G. 1965. Mammals of the Pacific States. Stanford University Press, Stanford, CA.

Jacques, Terri.1983. Supplemental Site Record for CA-MNT-812H, CA-MNT-811H, CA-MNT-813H. On file at Northwest Information Center (NWIC), Rohnert Park, CA.

James, Patrick. 2002. Historical Development of Arch Dams. In Australian Civil Engineering Transactions, Vol. CE43, pp. 39-56. Available at http://traianus.rediris.es/textos/archdams_en.htm.

Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of Special Concern in California. California Department of Fish and Game, Rancho Cordova, CA.

Jensen, Tim, Planning and Programs Manager, Monterey Peninsula Regional Park District. 2006a. Email communication with Jeannie Cziesla, ENTRIX, Inc. August 4, 2006. Subject: Public access on Park-owned land.

Jensen, Tim, Planning and Programs Manager, Monterey Peninsula Regional Park District. 2006b. Email communication with Jeannie Cziesla, ENTRIX, Inc. August 4, 2006.

Jensen, Tim, Planning and Programs Manager, Monterey Peninsula Regional Park District. 2006c. Phone communication with Jeannie Cziesla, ENTRIX, Inc. August 17, 2006. Subject: Park District land ownership.

Jensen, Tim, Planning and Programs Manager, Monterey Peninsula Regional Park District. 2007. Phone communication with Jeannie Cziesla, ENTRIX, Inc. August 10, 2007. Subject: Jeep trail improvements.

Jones and Stokes Associates, Inc. 1998. National Register of Historic Places Evaluation Report of the San Clemente Dam Seismic Retrofit Project Monterey County, California.

Joyner, W. B. and D. M. Boore. 1981. Bulletin of the Seismology Society of America, Vol. 71, No.6, pages 2011-2038.

Joyner, W. B. and D. M. Boore. 1988. Measurement, characterization, and prediction of strong ground motion, in *Earthquake Engineering and Soil Dynamics If--Recent Advances in GroundMotion Evaluation,* J. L. Von Thun (Editor), A.S.C.E., New York 43-102.

Kondolf, G.M., and R.R. Curry. 1984. The Role of Riparian Vegetation in Channel BankStability: Carmel River, California. In California Riparian Systems: Ecology, Conservation, and Productive Management. R.E. Warner and K.M. Hendrix, editors. pp. 124-133. University of California Press, Berkeley and Los Angeles, CA.

Laudenslayer, W.F. Jr. 1999. Are House Counts Reliable Estimators of Dusky-Footed Woodrat Population Size? In Transactions of the Western Section of the Wildlife Society Vol. 35, pp. 71-75.

Mark Group, The. 1995. Geotechnical and Engineering Studies for the New Los Padres Water Supply Project. March.

Mayer, K. E. and W. F. Laudenslayer, Jr., eds. 1988. A guide to wildlife habitats of California. State of California, Resources Agency, Department of Fish and Game, Sacramento, CA.

McEwan, D. and T. A. Jackson. 1996. Steelhead restoration and management plan for California. California Department of Fish and Game, Sacramento, CA.

McKittrick, M.A. 1987. Geologic map of the Tularcitos fault zone, Monterey County, California: Monterey County Planning Department open-file report, 22 p., 5 map sheets, scale 1:12,000.

Miller, C. M. 1943. An intergrade population connecting *Anniella pulchra pulchra* and *Anniella pulchra nigra*. In Copeia, Vol. 1943, No. 1 (Mar. 31, 1943), pp. 2-6

Monterey Bay Unified Air Pollution Control District (MBUAPCD). 2004a. CEQA Air Quality Guidelines. October 1995 (last revised June 2004).

Monterey Bay Unified Air Pollution Control District (MBUAPCD). 2004b. Air Quality Management Plan for the Monterey Bay Region. September 2004.

Monterey County Department of Public Works Traffic Engineering (MCDPWTE). 2005. 2004 Annual Average Daily Traffic.

Monterey County Department of Public Works. 2003. Guide for the Preparation of Traffic Impact Studies.

Monterey County. 1996. Monterey County General Plan Update. November 12, 1996.

Monterey Peninsula Water Management District (MPWMD).1984. New San Clemente Project.

Monterey Peninsula Water Management District (MPWMD). 1994. Monterey Peninsula Water Supply Project Final Environmental Impact Report/Statement, Volume 1.

Monterey Peninsula Water Management District (MPWMD). 1998a. Draft Supplemental Environmental Impact Report for the Carmel River Dam and Reservoir Project. Available at http://www.mpwmd.dst.ca.us/seir/seir.htm.

Monterey Peninsula Water Management District (MPWMD). 1998b. Carmel River Basin, Surface Water Quality Data Report, Water Years 1991-1996. Monterey, CA.

Monterey Peninsula Water Management District (MPWMD). 2003a Carmel River Basin, Surface Water Quality Data Report, Water Years 1997-2003. Monterey, CA.

Monterey Peninsula Water Management District (MPWMD). 2003b. 2001-2002 Annual report (July 1, 2001 - June 30, 2002) for the MPWMD mitigation program.

Monterey Peninsula Water Management District (MPWMD). 2004. 2003-2004 Annual Report (July 1, 2003 - June 30, 2004). MPWMD Mitigation Program: Water Allocation Program Environmental Impact Report.

Monterey Peninsula Water Management District and Carmel River Water Conservancy (CRWC). 2004. Environmental and Biological Assessment of Portions of the Carmel River Watershed. Available at http://www.mpwmd.dst.ca.us/programs/river/watershed_assessment/watershed_assessment.htm.

Monterey Peninsula Water Management District. 2006. Unpublished data of the SHSRF estimates on juvenile numbers and survival. Item 23 Carmel River Fishery Report: Informational Items/Staff Reports for the MPWMD Board Meeting Feb 13, 2006. Available at http://www.mpwmd.dst.ca.us/asd/board/boardpacket/2006/20060223/23/item23.htm.

Munsell Color. 1994. Munsell soil color charts. Macbeth Division of Kollmorgen Instruments Corps., Baltimore, MD.

Museum of Vertebrate Zoology. 2005. MVZ Data Access, University of California, Berkeley. Available at: http://mvz.berkeley.edu/Collections.html.

Mussetter Engineering, Inc (MEI). 2003. San Clemente Reservoir and Carmel River Sediment-Transport Modeling to Evaluate Potential Impacts of Dam Retrofit Options. Prepared for American Water Works Service Company, Voorhees, New Jersey, April 2003.

Mussetter Engineering Inc (MEI). 2005. Hydraulic and Sediment-transport Analysis of the Carmel River Bypass Option, California. April 25.

Mussetter Engineering Inc (MEI). 2006. Evaluation of Sediment Sluicing Options Associated with the San Clemente Dam Fish Ladder. March 16.

Mussetter Engineering Inc (MEI). 2007a. Summary of Hydraulic and Sediment-transport Analysis of Residual Sediment: Options for the San Clemente Dam Removal Retrofit Project. March 19.

Mussetter Engineering Inc (MEI). 2007b. Additional Modeling to Evaluate Sediment Sluicing Options and Compare Downstream Sediment Concentrations for EIR/EIS Alternatives, San Clemente Seismic Safety Project. March 23, updated August 9.

National Marine Fisheries Service (NMFS). 2000. Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act. June 2000.

Newcombe, C.P. and J. O. T. Jensen. 1996. Channel Suspended Sediment and Fisheries: A Synthesis for Quantitative Assessment of Risk and Impact. N. Amer. Jour. Fish. Man. 16: 693-727.

Norris, David, Consulting Engineer, California American Water Company. 2005. Personal visit with Marcia Montgomery, ENTRIX, Inc. August 3. Subject: Pipeline and Chemical Building for filtration plant.

Olberding Environmental, Inc. 1998. Wetland/waters delineation for the San Clemente Dam Seismic Retrofit Project. Unpublished report prepared for California American Water Company. November, 1998.

Remsen, J.V. 1978. Bird species of special concern in California. California Department of Fish and Game, Nongame Wildlife Investigations, Wildlife Management Branch, Administrative Report#78-1, Sacramento, CA.

Rogers E. Johnson & Associates. 1984a. Investigation of Possible Fault Offsets in Stream Terraces along the Carmel River at Sleepy Hollow. April.

Rogers E. Johnson & Associates. 1984b. New San Clemente Dam Geotechnical Investigation' Location of Faults Through or Near the Proposed Dam Site. July.

Rogers E. Johnson & Associates. 1985a. New San Clemente Dam Geotechnical Investigation of Faulting in the "Knothole" Area. January.

Rogers E. Johnson & Associates. 1985b. Preliminary Report of Landsliding in the Vicinity of the Proposed New San Clemente Reservoir. December.

Rosenberg, L.I., 1993, Earthquake and landslide hazards in the Carmel Valley area, Monterey County, California: San Jose, Calif., San Jose State University, M.S. thesis, 123 p., 2 appendices, 3 map sheets, scale 1:24,000.

Rosenberg, Lewis. 2001. Geologic Resources and Constraints, Monterey County, California: A Technical Report for the Monterey County 21st Century General Plan Update Program, prepared for County of Monterey Environmental Resource Policy Department.

Ross, D.C., 1976, Reconnaissance geologic map of pre-Cenozoic basement rocks,northern Santa Lucia Range, Monterey County, California: U.S. GeologicalSurvey Miscellaneous Field Studies Map MF-750, 7 p., 2 plates, scale 1:125,000.

Rossman, D. A., N. B. Ford, and R. A. Seigel. 1996. The garter snakes: Evolution and ecology (Animal Natural History Series, Vol. 2). University of Oklahoma Press, University of Oklahoma Press, Norman, OK.

Sawyer J. O. and T. Keeler-Wolf. 1995. A manual of California vegetation. California Native Plant Society, Sacramento, CA.

Seed, H. B., and P. B. Schnabel. 1980. Ground Motions and Soil Liquefaction during Earthquakes: Engineering Monographs on Earthquake Criteria, Structural Design, and Strong Motion Records, Vol 5, Earthquake Engineering Research Institute, Berkeley, CA.

Shaffer, H. B., G. Fellers, S. R. Voss, J. C. Olive, and G. B. Pauley. 2004. Species boundaries, phylogeography and conservation genetics of the red-legged frog (*Rana aurora/draytonii*) complex. Molecular Ecology 13:2667-2677.

Shapovalov, L and A.C. Taft. 1954. The Life Histories of Steelhead Rainbow trout and Silver Salmon with special reference to Waddell Creek, California. Fish Bulletin 98, California Department of Fish and Game 1954.

Small, A. 1994. California Birds: Their Status and Distribution. Ibis Publ., Vista, CA.

Smith, Jerry and Dawn Reis. 1996. Pescadero Marsh Natural Preserve Salinity, Tidewater Goby and Red-legged Frog Monitoring For 1995-1996. Report prepared for California Department of Parks and Recreation.

Smith, D., W. Newman, F. Watson, and J. Hameister. 2004. Physical and Hydrologic Assessment of the Carmel River Watershed California. Report WI-2004-05/2, 1 November 2004. The Watershed Institute, California State University, Monterey Bay.

Snider, William M. 1983. Reconnaissance of the Steelhead Resource of the Carmel River Drainage, Monterey County. Environmental Services Branch Administrative Report No. 83-3.

Soil Conservation Service of the U.S. Department of Agriculture, [now Natural Resources Conservation Service]. 1978. Soil Survey for Monterey County, California.

South Coast Air Quality Management District. 1993. CEQA Air Quality Handbook. Available at http://www.aqmd.gov/ceqa/hdbk.html.

Stebbins, R. C. 1951. Amphibians of Western North America. University of California Press, Berkeley, CA.

Stebbins, R. C. 2003. A Field Guide to Western Reptiles and Amphibians. Third Edition. Houghton Mifflin, Boston, MA.

Storer, T. I. 1925. A synopsis of the amphibia of California. University of California Publications in Zoology 27:1-342.

Thompson, K. 1972. Determining Stream Flows for Fish Life in Pacific Northwest River Basins. Commission on Instream Flow Requirements Workshop, March 15-16, 1972.

Transportation Research Board. 1985. National Cooperative Highway Research Program Report 279, Intersection Channelization Design Guide, November 1985.

Transportation Research Board. 2000. 2000 Highway Capacity Manual (HCM).

Trenham, P.C., H.B. Shaffer, W.D. Koenig, and M.R. Stromberg. 2000. Life History and Demographic Variation in the California Tiger Salamander (*Ambystoma californiense*). Copeia, 2000 (2), pp. 365-377.

U.S. Army Corps of Engineers. 1987. Corps of Engineers wetlands delineation manual. U.S. Army Corps of Engineers, Washington, D.C.

U.S. Census Bureau. 2005. Census 2000. Washington, D.C. Available at www.census.gov.

U.S. Department of Agriculture. 1978. Soil survey of Monterey County, California. U.S. Department of Agriculture, Soil Conservation Service, the U.S. Forest Service, and the University of California Agricultural Experiment Station.

U.S. Department of Housing and Urban Development. 2005. Available at www.census.gov.

U.S. Environmental Protection Agency. 1971. Noise from Construction Equipment and Operations, US Building Equipment, and Home Appliances. Prepared by Bolt Beranek and Newman for EPA Office of Noise Abatement and Control, Washington, DC.

U.S. Environmental Protection Agency (EPA). 1995. SCREEN3. September 1995.

U.S. Environmental Protection Agency (EPA). 1998. *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses*, Washington, D.C.

U.S. Environmental Protection Agency (EPA). 2003. AP-42 Chapter 13.2.2 Unpaved Roads. December 2003.

U.S. Environmental Protection Agency (EPA). 2006. Compilation of Air Pollution Emission Factors, Volume 1: Stationary Point and Area Sources (AP-42). Fifth Edition, EPA, Chapter 13.2.2: Unpaved Roads, November 2006 (revised).

U.S. Fish and Wildlife Service (USFWS). 1996. Endangered and threatened wildlife and plants: determination of threatened status for the California red-legged frog. Federal Register 61(101):25813-25833.

U.S. Fish and Wildlife Service (USFWS). 2002. Recovery plan for the California red-legged frog (*Rana aurora draytonii*). Region 1 U.S. Fish and Wildlife Service, Portland, OR. Viii+173 pp.

U.S. Fish and Wildlife Service (USFWS). 2005. Revised guidance on site assessments and field surveys for the California red-legged frog. August 2005.

U.S. Fish and Wildlife Service (USFWS). 2007. Threatened and Endangered Species System (TESS). Available at http://ecos.fws.gov/tess_public/StateListing.do?state=all

U.S. Geological Survey. 2005. 2005 Carmel River at Robles del Rio stream flow gage (#11143200).

Warner, R. E. and K. M. Hendrix, eds. 1984. California riparian systems: ecology, conservation, and productive management. Berkeley: University of California Press, Berkeley, CA.

Waters, T. F. 1995. Sediment in streams: sources, biological effects, and control. American Fisheries Society Monograph 7. Bethesda, MD.

Wiebe, R.A. 1970. Pre-Cenozoic tectonic history of the Salinian block, western California Geol Soc Am Bull 1970 81: 1837-1842.

Wiens, J.A. 1970. Effects of early experience on substrate pattern selection in Rana aurora tadpoles. Copeia 1970(3):543-548.

WESTEC Services, Inc. 1983. Archaeological Site Record for the State of California, Resources Agency, Department of Parks and Recreation, Carmel Valley, #MNT-812H.

WESTEC Services, Inc. 1984. Cultural Resources Survey, San Clemente Dam Enlargement, Upper Carmel Valley, Monterey County, California (December 1983). Prepared by WESTEC Services, Inc., San Diego, for MPWMD. Report on file at Northwest Information Center (NWIC), Rohnert Park, CA.

Wilcox, James. 1918. Report on the Additional Storage Required and Location, Size, Type and Cost of Dam for the Monterey County Water Works, in 1918 Report by J.A. Wilcox folder, on file at the California American Water Company, Monterey, CA.

Williams, D.F. 1986. Mammalian species of concern in California. California Department of Fish and Game Report 86-1. California Department of Fish and Game, Sacramento, CA

Woodward-Clyde Consultants (WCC). 1992. Seismic and Flood Stability Evaluation, San Clemente Dam Report.

Woodward-Clyde Consultants (WCC). 1995. Structural Improvement of San Clemente Dam, Preliminary Feasibility Study. Prepared for California American Water Company.

Woodward-Clyde Consultants (WCC). 1997a. Preparation of Dam Failure Inundation Maps for San Clemente Dam.

Woodward-Clyde Consultants (WCC). 1997b. Design Memorandum, Seismic Retrofit of San Clemente Dam. October.

Woodward-Clyde Consultants (WCC). 1997c. Study report. October.

Woodward-Clyde Consultants (WCC). 1998. Subsurface Investigation San Clemente Dam Seismic Retrofit of San Clemente Dam. May 19.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White. 1988. California's wildlife: Volume I, amphibians and reptiles. California Department of Fish and Game, Sacramento, CA.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White. 1990a. California's wildlife: Volume II, birds. California Department of Fish and Game, Sacramento, CA.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White. 1990b. California'swildlife: Volume III, mammals. California Department of Fish and Game, Sacramento, CA.

Zweifel, R. G. 1955. Ecology, distribution, and systematics of frogs of the *Rana boylei* group. University of California Publications in Zoology 54:207-292.

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